

# COAL AGE

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Engineering Editor

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## A Merry Christmas

THIS YEAR *Coal Age* makes Christmas Day the occasion of one of its fifty-two appearances, and we hope that the spirit of Yuletide is still present when this issue reaches you. After all, those men only are happy who carry the Christmas spirit through the year, dispensing cheer, radiating goodwill, turning up the brighter sides of everything and driving away gloom. Americans are happy people. They work hard but they laugh heartily. Joy is in their labor.

The game of life is worth playing. Let us view it as a game to be played well and lustily but without too much resentment if at times the luck seems against us. Its hazards are as necessary to add spice to existence as are the bunkers in a game of golf. Its rains are fruitful as summer showers if rightly used. Some spirits are destroyed and denuded by them, but others are brought only to a fuller maturity. Many a man whose life seems hard, whose labor would appear unusually distressing can smile more and love more and be more than those whose lives are easier, for he has the Christmas spirit not only at Yuletide, when the fires burn brightly, but through the gloomy days, along sodden pathways. Let Christmas guide and cheer us through the New Year to come.

## New Opportunities, New Methods

IN THE Connellsville region, coal companies till recently needed only enough coal to charge their ovens, and they could not build many of them for the field adjacent would be worked out before the life of the ovens was fully spent. So there was no anxiety to get out any more from each mine than a certain tonnage and one that has not for years been considered large. But now the coal goes to byproduct ovens and the river affords a cheap way of reaching them, so a new spirit is again in the air and the Connellsville region—the expression is used in a larger sense than is perhaps permissible—is going to see some big changes. The H. C. Frick Coke Co. has quickly recognized that a new day has dawned.

With the broad vision which it always has had, whether under Thomas Lynch or Walter C. Clingerman, it has adopted large methods. The venture at Colonial will be only one of these doubtless. Perhaps we cannot call it a venture; it was so carefully planned, as Thomas W. Dawson shows us in the article which we publish in this issue. Every difficulty was met in advance, every eventuality anticipated. The relative cost of old and new methods was so carefully weighed that there was no venture after all. It was as certain as any business move can possibly be. But it broke so completely with the past that it set the wisecrackers gaping.

Now it is done and the system of reasoning back of it explained, it seems so obvious and so clear that we wonder it was not done before. But nevertheless, it is an achievement of a large order. From a conveyor

line a few hundred feet long a jump was taken to one four miles and more in length. The factor of extension is so large that it makes us start. If the H. C. Frick Coke Co. has done this thing, what may it not do in the future?

## We Compliment Mr. Lewis

IT MUST be noted that President Lewis of the United Mine Workers is finally trying to put the screws to the recalcitrant anthracite miners in the Pittston region. He has suspended ten local charters, whatever force or effect that action may have, and thereby deals at least a slap, if not a knockout, to several thousand union miners who thought they were superior to international union authority. They struck, they say, because they thought the Pennsylvania Coal Co. and the Hillside Coal & Iron Co. were not making their mines safe enough and then they refused to go back to work pending arbitration, as the international directed. Today they do not belong to the United Mine Workers of America.

This revoking of charters to compel miners to live up to their contracts with operators is commendable on Mr. Lewis' part. Would that the union president had been more vigorous in the past in his defense of labor contract. Had that been his practice, it is possible there would not have been need for it in Pittston now, even though the anthracite union district organizations are chesty by habit and feel themselves almost if not altogether independent of international dictation.

This is the third unauthorized strike of anthracite miners on a large scale during the year. There has been a good deal of previous opportunity, therefore, for Mr. Lewis to crack down on union offenders in hard coal territory. We will not pretend to explain why he did not do so. The union election is over now, however. Mr. Lewis is safely continued in office, and the question of vote-loss does not enter into the matter of punishing miners' locals for breaches of contract.

## Obit Coal Review

OUR READERS will be interested to note that the National Coal Association has decided to discontinue its organ the *Coal Review*. Few, if any, publications of industrial and engineering associations have been found self-sustaining. Most of them are a heavy burden upon the body by which they are supported. The National Coal Association has tried out the venture and knows now just what such an emprise promises. At first it had strong hopes of success, but of recent years it allowed the effort to lag and has not supported the paper by large appropriations.

*Coal Review* and *Coal Age* for years have had a friendly rivalry, both papers circulating among a certain section of our readers. Some persons have contended that an association buttressed by the con-

tributions of its membership has no right to enter into the publishing business. Be that as it may, when an association finds that the information it desires to impart to its readers can be more economically transferred to them in some other way, either by communications at stated periods or when occasion suggests, it is not long in deciding that it will adopt some other method of reaching its audience. *Coal Age* will be happy to serve as a medium for this communication.

The officers of the National Coal Association have always, and doubtless will, continue to show the most friendly co-operation with this publication. It promises to continue that service and even to extend it further if that be possible. That is indeed well. The best way to influence the whole industry is by communications to the press of that industry, made, not in an association paper, but as a press release or letter to the editor. Periodicals do not favor copying material from another publication, however authoritative.

Associations are always hampered in issuing a periodical. Everything that appears in it is regarded as official and implicates the association. Consequently the editors cannot have a mind of their own. This makes the copy relatively unimpressive. A pronouncement made by some official body of the organization, it is true, can be published, but any such statement is now regarded as public property and finds its place inevitably into the public press. As a result no matter who may be the editor, he is not able to put into the paper the independence and promptness of judgment that can be shown by the editorial staff of any private publication. An association organ, being a mouthpiece of the whole organization, cannot lead; it must follow. That is why some of them have omitted editorial comment. Others that regarded their duty as being to support higher prices wrote editorials of a kind that could not fail to please the membership but caused suppression of the association.

The way of such an organ is hard. It is regarded, however, as an opportunity to publish at length in all their interminable verbiage, declarations of the Commonwealth and bills in process of consideration. This adds its value to the publication but tends to prevent its being read. Of late the *Coal Review* largely confined itself to Washington news. It frankly converted itself into a gazetteer of Washington and the Association and did not venture into other fields.

### Growing Power of Mine Workers

IN VIEW of the fact that the strikes and suspensions of the United Mine Workers of America are among the most painful memories in our industrial history and in the conduct of our home life we must look with regret on the prospect of having the U. S. Labor Department under the control of the President of the United Mine Workers of America, and the American Federation of Labor under that of the secretary of the same organization.

The British public has suffered so severely from the dominance of the coal miners that it would be well for us as a nation to take warning. The Federation of Labor can do as it will. It is not influenced by the fact that the payment of excessive and unusual wages to miners and the inconvenience of long protracted suspensions will be as harmful to its supporters as it is to the other consumers. But surely the Administration will know better than to put the United Mine Workers

in such power that it can control its destiny without any restraint and without any consideration of the needs of the public. Let Mr. Coolidge resist the pressure that is being placed upon him to put the control of the coal industry into the hands of special interests.

Nothing said here, however, should be taken as inimical to William Green, the new President of the American Federation of Labor. He like his predecessor is no advocate of "Rule or ruin."

### What's This? Strike Talk?

COMES now the official miners' union publicity man deposing and stating in print that non-union coal operators and other "union haters" are basely conspiring to produce a general union strike next April. This new discovery—made afresh every now and then ever since the creation of the miners' union—is based on the alleged facts that the non-union operators want to shut off all union coal so that they can gouge the public, while the other "haters" hope a strike will reduce the weakened union to a state of complete collapse.

Could this be an alibi? Are the hard-put leaders of the Mine Workers turning in desperation to their old tactics? Are they hoping they can somehow engineer a strike as the only way out of their difficulties? Let us see.

Here, in an editorial in the official union organ, appears this passage referring to the conspiracy: "President Lewis is cognizant of this situation. The United Mine Workers as an organization is aware of it. The only alternative to a strike is a reduction of wages to the 1917 level." Decipher that.

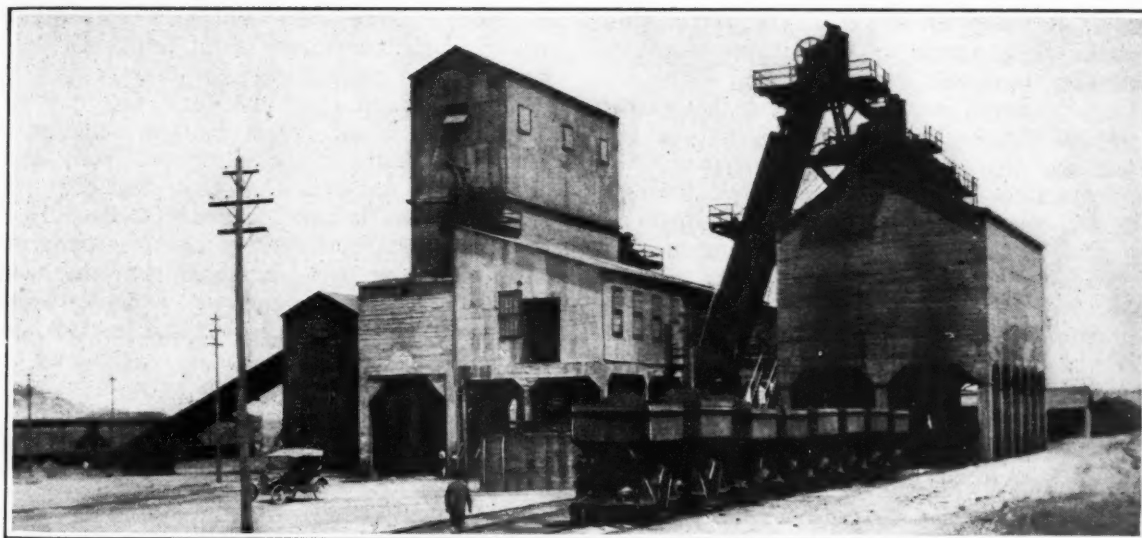
The union has suffered heavy losses of territory in West Virginia, Kentucky, Oklahoma and in such far-flung regions as Crows Nest Pass in British Columbia. It is suffering severely even in the heart of unionism for lack of work. It cannot stand this strain forever. In view of this situation, do the leaders of unionism feel that the Jacksonville agreement is strangling unionism to death and that wages must be reduced by hook or crook as the only salvation? Then how to reduce them!

Mr. Lewis cannot initiate a move for a reduction. He has taken his stand for "no backward step." If he voluntarily changed that position the rank and file would turn and rend him. The task is to produce a popular demand for a wage cut from that very rank and file before the union disintegrates for want of it.

Why not do it by a maneuver that would cause the union to be "forced into a strike? Miners are notoriously tenacious to the cause of unionism when they are striking for the honor and glory of the organization—certainly more tenacious than in a time of high pay and low work as now. If a strike were to run awhile and the rank and file got ready to accept a wage cut, Mr. Lewis would have been saved the ignominy of proposing the backward step, a dangerous crisis for the United Mine Workers would have been passed and the union, even in defeat, would be stronger than a union choked to death with the Jacksonville agreement.

But it is nearly impossible to conceive of a plausible excuse for striking. Certainly it would be a tough job for the miners' union to justify itself before the public even if it were "forced" into a defensive strike. So we can only remark that if Mr. Lewis feels there is nothing left but battle, his stock of resources is woefully low.





Washer of Cia. Combustibles de Agujita.

## Men Well Treated in American Mines of Mexico

Reminiscences of Former Official of Cia. Combustibles de Agujita in Coahuila—Care Taken of Safety, Health and Earnings of Workmen—After Mines Were Destroyed by Outsiders, Company Fed Women and Children

By W. A. Roy

Superintendent, Marine Smokeless Coal Co.,  
Rockwood, Pa.

**D**ESPERATE efforts are being made by the labor party in Mexico to discredit the foreign corporations in that Republic because these companies naturally oppose the policy of confiscation advocated by the leaders of that party, but Ricardo Trevino, who is the Secretary of the Mexican Trade Union Federation, made a bad move, when in his letter to certain members of the British Labor Party he asserted that in the mines of Mexico, which produce chiefly coal and silver, no less than 52 per cent of the men are injured every year by accident. Possibly Mr. Trevino did not expect his letter to be published in the English paper, at least did not expect it to be copied in the United States, where there are hundreds of engineers who know how great an exaggeration such a statement is.

Though not connected with any mining or other interests in Mexico, I have visited nearly every mining field in that country, have friends or acquaintances in many of them and for four years was connected with one of the most important coal operations there. As I speak, read and write Spanish I got my facts first-hand and not from "hearsay." A true statement of these facts is even more to the interest of the Mexican workman than to that of the foreign investors, and as I am at present not connected with either, I feel no partiality and will let no prejudice color my story.

Coahuila is the most important coal-mining state in Mexico. Several big coal companies operate in the Sabinas field about 80 miles from the Texas border.

The Compañia Combustibles de Agujita has coal mines at that place, and, at the time I was there, it was one of the fourteen units operated by the Mexican branch of the American Metal Co., all the other units, except one, being metal mines. The American Smelting and Refining Co. operates the largest coal mines in Mexico, at Rosita, just five miles from Agujita, and an English company operates at Cloete, between Rosita and Agujita. All these companies have mines, coal washers and coke ovens and employ from one to five thousand Mexican workmen.

When I went to Agujita in 1917, it was still in process of rebuilding, after a shutdown of several years, made necessary by the burning and dynamiting during the Carranza revolution. Four coal tipples, a washer, the machine shops, foundry, power house, round house, coke ovens, storehouses, hospital, offices, schoolhouses and residences as well as railroad and mine equipment had to be bought or built. One can easily see that it was no light investment for the operators.

### PICKED UP STRENGTH AFTER PERIOD OF WORK

It was pitiful to see the half-starved haggard men who, in ever increasing numbers, flocked in hoping for an opportunity to work. More than we could use came, bringing their families and all their worldly possessions, sometimes packed in the high two-wheeled Mexican carts, drawn by thin patient little "burros," sometimes in a ragged bundle on their shoulders.

At first it took four men to do the work that one good husky American could have accomplished, but it was remarkable that they could work at all, considering that most of them had been living on the "husks of nothing" for about three years and, after they had been with us a month or two, it was hard to believe that they were the same men.

After the four mines were opened and the washer and coke ovens in operation, we employed over two thousand men and though there were, of course, many minor accidents, the company, through self interest, if nothing else, used every means to make them as few as possible. Each man received compensation from the company the entire time he was disabled and for the small stipend of 60 centavos a month he got medical attention and medicine, not only for himself but for his entire family. The doctor in a mining village is usually absolute monarch in his department, and at Agujita he had a druggist and a trained nurse to assist him.

He had also a sanitary corps consisting of twenty

the general manager made frequent inspections, and we all believed that "constant vigilance is the price" of safety. One of our mines was very gaseous and unfortunately the Mexican miner adores his cigarette, but though there were 800 men employed in this gaseous mine, only three fatal accidents occurred in this particular mine during the four years I was with the company and only one fatal accident in all the others. This is not guesswork, but a matter of actual record, kept both by the mining company and by the Mexican civil authorities of that district.

Knowing the miners' tendency to gamble with his life we had safety lamps of the most improved type which were kept in a lamphouse near the head of the shaft under charge of competent and trustworthy men. Each miner received his locked and lighted lamp as he went to work and returned it as he came up the shaft. He was not only required to turn over to the man at the lamphouse any matches or smoking material he might have in his possession, but he was searched to see that he was not hiding any from us, both before



#### Patio and Shops

At Almacen No. 2 mine, Agujita, Coahuila, Mex. The patio is the fenced area in which the town is located. The company removed garbage, oiled water holes and kept the village in sanitary condition. The area occupied by the village merchants outside the patio and the jurisdiction of the company showed neglect.

men whose duty it was to keep the streets clean, to dispose of garbage, to oil water holes and to do any other work the doctor considered necessary for the health of the village. The company employees lived in a part of the town separated from the Puestos—as we called the quarters occupied by Mexican tradesmen—by a small park and a fence, but the cleanliness on one side and the filth on the other made a more striking division.

#### NEVER KNEW MINES WITH FEWER ACCIDENTS

I have been a mine superintendent for twenty years, but I have never known any mines where there were fewer accidents than at Agujita. It was not because the mines are inherently safe nor because the Mexicans are naturally careful. Quite the contrary: but we rigidly required compliance with every safety rule in force in the mines of the United States and added some extra ones made necessary by local conditions, and took every precaution humanly possible to prevent accidents or injury. And here I want to pay tribute to my Mexican mine foremen and firebosses. They had no certificates, I trained them myself, and though they probably would have flunked on any written examination, they were as trustworthy and efficient as any men I have ever had to work with me.

All the Agujita mines were well ventilated and kept clean, and one foreman stayed in each mine eight hours every day, the superintendent visited every mine daily,

entering the cage and after he got out at the foot of the shaft. As one man was discovered to be smuggling cigarettes and matches in his hair you can see that the search needs to be thorough.

#### RAISED WAGES BUT GOT LESS COAL AS RESULT

The Mexican makes a good miner, but he is not what you would call an enthusiastic worker and with few exceptions if he meets his daily needs he takes absolutely no thought of the morrow. To get results one must know his peculiarities and shortcomings and how to sidestep them. For instance we decided at Agujita that we could afford to give our miners a wage increase if it would produce a larger tonnage, and we were chagrined and surprised to discover that the wage increase had just the opposite effect from what we desired and expected.

On investigation we discovered that from the time the wage increase went into effect most of our best miners had acquired the habit of taking from one to three holidays a week. They were making enough for their actual needs on the old schedule and so higher pay only meant more leisure for them and we had to work a new scheme on them. We revoked the wage increase and gave them a tonnage bonus which amounted to the same thing, only if a man did not work regularly and get out the tonnage that the foreman and I decided was reasonable he got no bonus. The scheme worked beautifully, and we doubled our



output, but perhaps Mr. Trevino would consider this cruel and barbarous treatment.

Care to prevent accidents may be due to self interest but, self interest does not dictate all that the companies in Mexico do for the welfare of the people; nearly all mining villages and all of those belonging to the large companies, have recreation buildings and equipment, schools, medical attention and supervision, and all the officials of the company are instructed to, and do, take a personal interest in the welfare of the people in the village.

#### INFLUENZA WORKS HAVOC EVERYWHERE

In the big "flu" epidemic of 1918 our whole camp was stricken as with a plague. I have had to help men up out of the mine and have them carried home, who went to work in the morning apparently in perfect health. Hundreds of our workmen and their families were stricken at one time. We had orders from our company to feed at the company's expense all families where the wage earners were ill, to give them all the medical attention they needed, to furnish coffins and to bury free all the dead and to do everything possible for the living. Of course money could not buy adequate medical attention. No extra doctors were available, for the plague raged everywhere, but our doctor ate and slept (if he slept at all) on the move, and every mine official, who was not himself ill, devoted all the time his work left him, to helping the doctor in his work. The fatalities were enormous, for the Mexican seems to lack stamina to resist disease. However, compared with that in the native towns, under native management, our mortality rate was almost negligible and fortunately the plague was not of long duration.

From 1918 to 1920, Agujita, barring a few bandit raids and excitements, was a peaceful, prosperous little mining town where work was plentiful and well paid, the people busy and contented, with the exception of a few malcontents who could be satisfied only by what Harry Lauder defines as a labor government, "All play, no work and all pay," when almost over night a crowd of agitators, from God knows where, invaded our camp, gathered in our malcontents and organized a sort of a local Soviet. How failing to get our men out by

oratory they resolved to use force, seized the power plant, and forced the men out of the mines by shutting off the ventilation, how they made "Muere los gringos" (Death to the foreigners) their slogan, and after asking impossible concessions of the company and being refused, they with de la Huerta's connivance, seized the mines and made a glorious fiasco of operating them, is too long a story to put down here, but that even under these circumstances the "Gringo" organization was not indifferent to the welfare of the people is proven by the following letter sent out from company headquarters:

#### FEED FAMILIES OF MEN WHO SEIZED MINES

Compania de Combustibles Agujita  
Sabinas, Coahuila.  
Gentlemen:

We acknowledge receipt of your letter of Oct. 16, and from copies of letters written to Mexico City, we think you will see our point of view, with regard to what we wish to be done at your camp.

In view of the fact that the mines have been flooded, pumps drowned and fans have stopped you can now assure any of the men with whom you talk, that we are not in any hurry whatsoever to start up the properties and that as long as the agitators who have brought all this trouble continue in this district, we would just as soon remain idle. We feel sure that the trouble has all originated with the agitators who have come into your camp and that it will pass with them and that they have willfully and maliciously deceived the miners and other men who work for you and that they must be defeated.

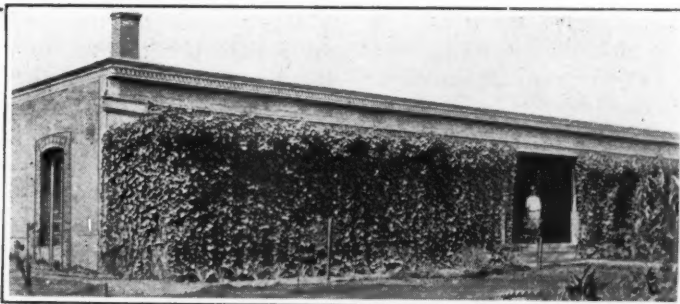
Referring to last paragraph of your letter, we wish to say that we do not bear any malice to any of the men, except the agitators and we do not wish to see the women and children suffer from hunger. We desire that you make every effort to locate any that are actually in need and see that these women and children are fed. We do not wish to feed any idle men, but we think that you can arrange to have some of the Mexican women in the camp work for you making tortillas and soup and cooking beans, and you can let it be known that any women and children who are hungry will receive one good meal a day at the company's expense.

Please advise if you can fix up this free kitchen and service and make every effort to help those who are in need of help.

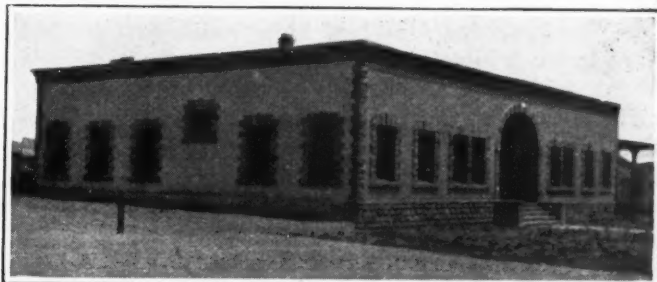
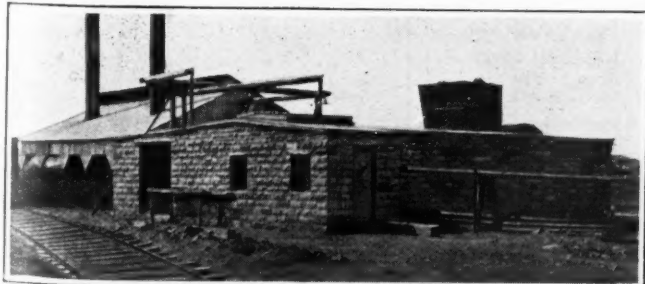
COMPANIA MINERA DE PENOLES.

I have written only of the companies for which I worked but almost everything I have said of this company is true of all companies formed by foreign capital in Mexico. The real workmen know they are better treated and better paid, under foreign than under native management, but unfortunately it is never the real workman who gets his views into print.

Manager's residence on right, a low ranging building with good ventilation and high rooms.



Ventilating fan at mine No. 2 on left below and company's office on right also below.



## Matanuska Coal Field Mines Only 7,000 Tons Monthly

Coal Varies from Lignite to Anthracite—Latter Is In Places 40 Ft. Thick but Folded and Penetrated by Dikes and Sills

**D**ESPITE all that has been said of the fortunes in coal that might be made out of the Alaska coal fields, the Bering field is still undeveloped and the Matanuska field is only producing 7,000 tons a month, less than two or three shafts in the United States can and have hoisted in a single day. What follows regarding the latter field is published on the authority of the U. S. Geological Survey.

The Matanuska coal field, which contains one of the most valuable coal reserves in Alaska, extends from an area near tidewater at the head of Knik Arm, an inland extension of Cook Inlet, eastward to the upper valley of Matanuska River, reaching a point within 8 miles of Matanuska Glacier. The Matanuska branch of the new Government railroad taps this coal field and draws from it much of the fuel used on that railroad.

Although the coal-bearing formation is of the same age throughout the field the coal shows a wide range in character. At the west end of the field, where the beds are only a little deformed, the coal is a lignite. Farther east, at Moose and Eska creeks, where the beds are somewhat folded and faulted, they contain bituminous coal of good grade, which is now being profitably mined to an extent justified by the market demand. Here several mines are now producing about 7,000 tons a month. Still farther east, in the vicinity of Chickaloon, the terminus of the Matanuska branch of the railroad, the coal is a bituminous coking coal of the first rank, but the structure of the beds is more complex than at Moose Creek. The coals of the highest grade, which are found on Anthracite Ridge, 12 miles east of Chickaloon, include anthracite of superior quality, but the beds are highly complex in structure. No attempt has yet been made to mine this anthracite.

### SURVEY RECENTLY COMPLETED

The part of the Matanuska Valley that includes the area near Chickaloon and the area immediately east of it form what is generally known as the upper Matanuska Valley. A survey of the upper Matanuska Valley, an area which is about 10 miles wide and extends 18 miles eastward from Chickaloon, was completed in 1924 by S. R. Capps of the Geological Survey, Department of the Interior, whose work supplemented a survey of a part of this area made in 1913 by G. C. Martin and associates. The lower part of the Matanuska coal field has already been surveyed. A report showing the results of the work done in 1924 is now in preparation.

No mines are now regularly operated in the upper Matanuska Valley. Mines opened from 1920 to 1922 by the Alaska Coal Commission at Chickaloon and on Coal Creek produced coal of high grade, but the beds were so much broken up or altered by faults and bodies of intrusive rock as to make the cost of mining very high, so that the work was stopped. Development work at a mine on the west bank of Coal Creek, however, is being continued by a private company.

The field work of 1924 indicates that the coal-bearing area east of Chickaloon is somewhat smaller than had been supposed. The dominant structure of the basis

is synclinal, and considerable areas of it that lie south of the axis of the syncline are now thought to be stratigraphically below the coal-bearing horizons at Chickaloon and to contain no workable coal. The coal beds at Coal Creek and at O'Brien Creek are believed to lie in faulted synclinal folds, most of the coal having been removed from the corresponding anticlinal folds by erosion. The reserves of minable coal at each of these places are believed to be limited to a few hundred thousand tons.

The coal-bearing area on the south flank of Anthracite Ridge contains beds carrying anthracite coal of excellent grade, which is exposed at many places. At a place on the head of West Fork of Purington Creek a bed of anthracite nearly 40 ft. thick crops out. In this area, however, the coal-bearing formation is highly disturbed by folding, crumpling, and faulting, as well as by bodies of intrusive rock, such as dikes and sills. The coal beds appear to lie in synclinal basins, most of the upper part of the folds having been removed by erosion. These beds no doubt contain considerable excellent anthracite coal, but whether it occurs in beds sufficiently large and continuous to justify the expense of mining is uncertain in view of the cost of building a railroad to it. Little prospecting has been done on the anthracite beds, and whether they include workable bodies of coal can be proved only by extensive exploration, both on the surface and underground.

### WILL NOT PAY COST OF BETTER COAL

The beds of bituminous coal near Chickaloon are so complex in structure that the coal cannot be mined for general use in steam raising in competition with the more cheaply mined coals of the lower Matanuska Valley, where, though the coals are of lower grade, the structure is simpler. The utilization of the coals of the upper Matanuska Valley depends on the development of a market for superior coals that cannot be supplied from the other beds in this region, on a price sufficient to yield a profit, notwithstanding the comparatively high cost of mining them, and on their ability to compete with coals of similar grade mined in other fields. The high-grade blacksmith coal of the Chickaloon area and the anthracite must compete with coal mined in the eastern part of the United States, but the cheapness of transportation of the high-grade Matanuska coals to markets on the west coast of the United States should favor their development. It is also possible that the market for the somewhat lower grade bituminous coals now being mined in the Moose Creek and Eska Creek districts could be extended to supply a demand now met by similar coal mined on Vancouver Island.

### Headframe at Rachel Mine

One of three shafts at this mine, all 360 ft. deep. The coal is hoisted by electricity. Coal is screened into 4-in., 2-in., 1-in. and slack.

Courtesy  
Bertha-Consumers Co.







Colonial Docks

## Four-Mile Belt Line Carries 9,426 Tons of Coal In One Day at Frick Company Mine

Nineteen 48-In. Belts and One of 60-In. Deliver to River Dump All Coal from Three Mines Formerly Entered by Shaft—Thirty-Five Cars Discharged at One Time by Each of Two Revolving Dumps

BY THOMAS W. DAWSON  
Chief Engineer, H. C. Frick Coke Co.,  
Scottsdale, Pa.

IN 1916 the H. C. Frick Coke Co. completed the arrangements necessary to load all coal from its mines lying directly along the Monongahela River in barges for transportation by water to the Clairton byproduct ovens. The plans of the U. S. Steel Corporation called for a further extension of its Clairton plant, which would require about 50,000 more tons of coal weekly than could be furnished by the river mines already equipped. Hence, it was decided to develop other coal for river transportation. This necessitated taking coal lying farther back from the river than was usually thus transported.

Colonial Mines Nos. 1, 3 and 4, of the H. C. Frick Coke Co. could be reached through the Alice Mine, of the Pittsburgh Coal Co., which was being operated as a river mine. These latter workings were almost exhausted and their main headings reached to the boundary of the Colonial coal field. A careful examination of the mine was made, and it was purchased from the Pittsburgh Coal Co. as an outlet to the Monongahela River for the three Colonial mines to which a large field of coal had been allotted. Probably the best way

in which to define its size is to say that it will have a life of twenty-five years when worked at the rate of 8,500 tons per day for 300 days in the year. After the purchase of this mine no further work was done until the Spring of 1918.

The problem facing the H. C. Frick Co. was the mining, transporting and loading in barges of 8,500 tons of coal per day, of which Colonial Nos. 1 and 3 were to produce 3,000 tons each and Colonial No. 4, 2,500 tons per day. Each of these mines was producing coal for the manufacture of coke in beehive ovens, having a total daily production of 3,350 tons for the three plants. This made it necessary to furnish each of these mines with sufficient equipment and also with the housing facilities for the additional men that must be employed if the needed tonnage was to be obtained from this field.

The coal being produced at this time was being hauled away from the river in most cases to the three shafts where it was hoisted and coked, and the coke shipped by rail to the steel plants. This arrangement made it possible to keep up operation without interference until the new scheme was completed, when the haulage was simply reversed and the coal taken to the river making the equipping of the mines a simple matter. They had to be supplied only with additional power,

NOTE—Article entitled "Underground Belt Transportation of Coal," read before the Coal Mining Institute of America, at its Pittsburgh meeting, Dec. 4.

mine wagons, mining machines and new haulage roads leading toward the river.

On the surface, a new town was built at each of the mines to accommodate the additional men required in the production of the larger tonnage. Attractive houses were built and the towns well laid out with graded streets, shade trees and sidewalks. A filtration plant was built to furnish both the old and new towns with filtered water, which was piped into the houses. Many of these dwellings have bathrooms and all are equipped with electric lights. A large boarding-house and bath-house were built at each town and all possible care taken to provide for the comfort and convenience of the men employed.

The improving and equipping of these three mines to produce the required tonnage was a comparatively simple matter, but the transportation of this output from the working face to the river was a problem which required careful consideration.

Naturally the first scheme considered was the transportation of this coal by electric locomotives and this method would undoubtedly have been adopted had not more than ordinary difficulty been encountered in providing adequate haulage roads.

#### HAULAGE TRACKS WOULD BE INADEQUATE

When Alice mine was purchased from the Pittsburgh Coal Co. it was almost completely mined out. Two headings remained from the boundary of the Colonial field to the river, but little pillar coal was left to support the roof. In fact, in several places the pillar on the outside of the headings had been pierced by room work, and holes had been stopped with burlap sacks in order to maintain proper ventilation. It was not possible to provide more than two tracks from the Colonial mines to the river. One of these must accommodate loaded, and one empty trips. Extensive roof protection was necessary in both of these headings to protect such important haulage-ways as these would have to be.

The mouth of this mine is just beneath the tracks of the Pittsburgh & Lake Erie R.R., and only a few feet above high water level of the river. The entire bank between the railroad tracks and the river, where the outside landing and river tipple had to be located, moves toward the river every year, necessitating extensive foundation work for the large trestle and tipple which would be required to handle this tonnage. The wagons in use at these mines had an average capacity of about 2.1 tons each, and, to produce 8,500 tons per day, would require handling about 4,000 of these wagons, or forty trips of one hundred wagons each. This would allow only 12 min. between trips regularly throughout an entire eight-hour day.

The H. C. Frick Coke Co. has had some experience with derailments, and this looked like a large undertaking. It was decided to abandon this small wagon, and one was adopted, for estimating purposes, of 3½ tons capacity, reducing the number to be handled to about 2,400, or twenty-four trips of one hundred wagons each, which, on such grades as must be traversed, require the use of a 75-ton locomotive to handle the load. An estimate of the cost of completely equipping these mines on this basis was prepared, but, due to the necessarily expensive outside arrangement and the danger anticipated from the sliding of the river bank, the scheme appeared unsatisfactory.

Four of the H. C. Frick Coke Co.'s mines were delivering their entire output on the river, all of which was

carried on belt conveyors from the shaft to the river, an average distance of about 500 ft. These were operating very satisfactorily, no delays being experienced in the operation of these installations. This led the staff of the H. C. Frick Coke Co. to conceive the idea of making the terminal of the locomotive haulage inside the mine where sufficient trackage could be obtained, transporting the coal outside to a much simplified tipple on the river. This would eliminate most of the danger from slides, decrease the length of locomotive haulage and materially lessen the cost of the loading arrangement at the river.

Further study along these lines indicated that, in order to get a satisfactory inside terminal for the locomotive haulage, the mine conditions would make it necessary to go back so far as to require an extensive system of belt conveyors. A careful analysis of the cost of operation of the various belt conveyors already in use gave conclusive evidence that these units could be installed in considerable number and operated at a saving over the original scheme involving locomotive haulage. This led the company to look into what then appeared a rather daring scheme.

As already stated, the size of the mine wagons would have had to be increased if the scheme of locomotive haulage had been adopted. The mines had 996 mine wagons already in service, most of which were in good operating condition. By taking the belt-conveying system back to a point or points where it could be reached by the existing equipment, the tonnage could be produced simply by purchasing a comparatively small quantity of new equipment for these mines and utilizing everything already in service. Two points in the field were selected. At one of these the Colonial No. 4 was to discharge its output. The other was for the discharge of coal from Colonial Nos. 1 and 3. Landings were planned separately for each mine so that each could operate as a separate unit with no interference from the other and with none of the mines using common tracks. This would allow the management to hold each mine responsible for its tonnage in exactly the same manner as if it had been delivering to its own shaft bottom, as it had in the past.

#### FIRST SCHEME PROPOSED TWO-CAR DUMP

A double landing was proposed for Colonial Nos. 1 and 3, each side having its own two-car rotary dump with both dumps discharging through a common hopper to an apron feeder designed to feed 860 tons per hour to a belt conveyor of the same capacity. Colonial No. 4 was to have a landing with a dumping arrangement of the same kind, served by a branch belt fed by an apron conveyor at the rate of 360 tons per hour. The conveyors from Colonial Nos. 1 and 3 were to be 42 in. wide, and from Colonial No. 4, 36 in. wide to their junction, from which point all remaining conveyors were to be 48 in. wide and carry 1,220 tons per hour. This rating would allow the proposed output to be handled from these mines in seven hours' working time, allowing one hour for unavoidable delays.

A detailed estimate was made along these lines for comparison with the one already made on a locomotive-haulage system, and it was found that the initial cost of the belt-conveying system would be less than the locomotive haulage system and would effect a slight saving in operation. These estimates were carefully checked several times during the next year, and the management was finally convinced that the belt-convey-



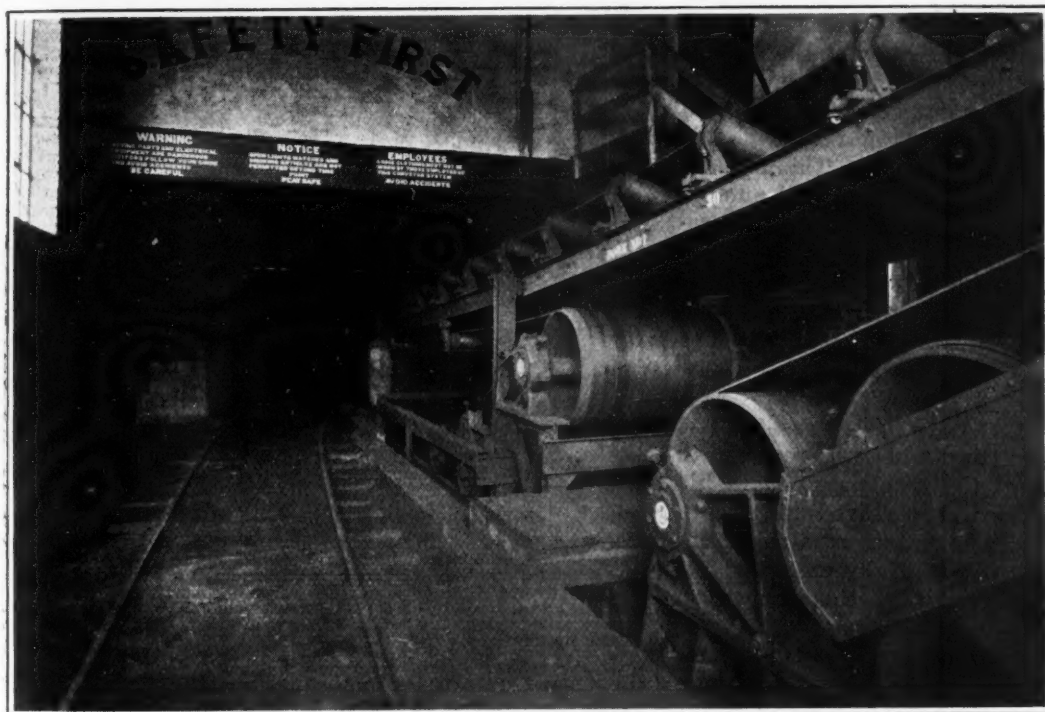
ing system was the correct plan for this project. Sufficient money was appropriated to cover the cost of the entire project, including new towns, water system, new electric power system, additional mine equipment and the conveying system, and the work actually started in October, 1920.

Specifications were immediately issued and bids on equipment asked from all the manufacturers of conveying equipment in the country. The designing at the start was naturally required to proceed with the work in the field, on account of the many limitations encountered which would not exist in outdoor work. All water entering the headings must be drained away and pumped outside. This makes it necessary to fix the grades on the conveyor to correspond with the drainage grades as nearly as possible. Ventilation must be taken into account. Grades must be established that will make it unnecessary to disturb either roof or bottom and adequate roof protection must be provided at all points.

It became obvious early in the development of this scheme that it would not be advisable to drive any of

give a clear discharge of the coal from belt to belt. This made a careful design of chutes between conveyors necessary and also made it obligatory to locate the drives back of the head pulley where they could be kept close to the floor. Throughout the part of the system located in the old Alice Mine headings these drives were all located in break-throughs where little additional solid coal had to be removed. In all cases the drives were kept as close to the head end of the conveyor as local conditions would permit.

At the very start of the design of this conveying system it was evident that it required little ingenuity to put together a series of belt conveyors to carry coal at the specified rate for this distance, but that the designing of such a system, keeping the cost, maintenance, power and attendance down to a point where it would be a truly economical system, was a real problem. In solving it the view was taken that the power for driving a conveyor is the most important consideration. The actual power consumption, though a considerable item in the operating cost, is the smallest measure of its importance in the design. The power required



#### Tandem Drive with Take-Up

Near the end of Belt No. 2 at the entrance to the Colonial Mine. Note the track which follows the conveyor line and is used for the lubrication car and as a supply track for the maintenance of the conveyor. As the old Alice Mine had a double track there is plenty of room for this track and the belt, side by side. Note also the cross beams. Throughout the Alice Mine passageway, steel work or brick arches have had to be provided.

these conveyors at the head pulleys, as is ordinarily done. The roof in this mine will stay up fairly well if the checker slate above the coal is not broken, but as soon as this is fractured high falls are almost certain to occur. This condition, if for no other reason, made it necessary to keep the height at which one belt discharged to the next one in the system as low as possible.

It was made clear in the comparison of operating costs of the two schemes that one of the main factors operating against the belt-conveyor system was the power required for its operation. It was apparent that a large part of this excess power was required to lift the coal the extra height at each belt intersection that would enable it to deliver the coal to the next unit. Where twenty units were required, the lifting of 8,500 tons of coal per day a matter of only a few inches at each intersection would show on the annual power bill.

These two considerations made it essential to keep the height between the tail pulley on one conveyor and the head pulley on the next to the minimum that would

fixes the size of motor and control, the size of the main shafts and the gear reduction and the ply of the belt, all of which directly affect the installation and overhead costs and, just as surely, the maintenance and replacement costs.

As a first step a series of power tests was run on the four conveyors already operating along the Monongahela River, and a formula was developed which would as nearly as possible fit all when length, speed, load and lift were taken into consideration. Knowing the conditions under which these conveyors were operating, this was considered a good basis from which to start in designing conveyors of a much greater efficiency. With this data lengths of conveyors were established with which it was certain the belts could be driven successfully. The data shown in Table I were compiled and from these the entire system was developed step by step.

It was believed that the first consideration in power reduction was the development of a better carrier than

had yet been placed on the market. The engineers started systematically "talking carriers" with all manufacturers and got as many as possible interested in making improvements which would meet the needs of the installation. The first requirement specified was that all bearings should be of high-grade anti-friction type with either ball or roller bearings. Lubrication must be positive and a system adopted which would make every bearing easily accessible for the future application of lubricant and reduce to a minimum the labor involved in taking care of the lubrication.

In this system there are in service 6,598 carriers, which makes the attendance to bearings and their proper lubrication important. To get the highest possible efficiency from these carriers every bearing must be in perfect condition, and, in order to keep them so, they must always be lubricated thoroughly. This brought up the question as to the number of pulleys to the carrier and a consideration of the three-pulley type was started at once, in order to reduce the number of bearings and, consequently, the amount of attendance necessary. The question of belt wear necessarily had to be considered when entertaining the idea of a change from the five-pulley type which has become practically standard. This was given much consideration and a meeting finally was held with several of the foremost manufacturers in which this feature was discussed for almost an entire day in open meeting. As a result of this study, the three-pulley type was adopted. This reduced the number of bearings, and, consequently, the number of places to be lubricated, from 65,980 to 39,588, a reduction of vital importance. With the three-pulley carrier adopted, the trough of the belt is practically the same as with the five-pulley type. It appeared certain that the carrying capacity of the belt would not be reduced materially.

#### BIDDERS FURNISH MODELS

Each manufacturer submitting a bid was required to furnish a sample carrier of the type proposed in his proposition. When all these were received and set up in one room, an excellent collection was available from which to choose, and they were carefully examined before a final selection was made. It became apparent, soon after bids were examined, that to get what was wanted for this system it would be necessary to consider each item of the equipment separately and purchase each major part of the equipment from the manufacturer giving the best in its line.

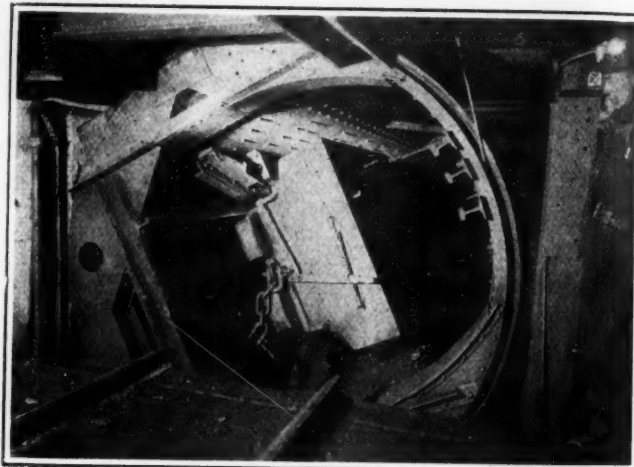
The carriers were purchased from the Stephens-Adamson Mfg. Co. This is a three-pulley carrier equipped with No. 204 S. R. B. annular ball bearings. It is substantially made, and all castings are of malleable iron. The bearing housings are of malleable iron, designed with a liberal grease reservoir and mounted so as to oscillate and thus take care of any inaccuracies in alignment—either in manufacture or due to accidents to the equipment. It has one unique feature which has proven very useful in operation. The entire upper part of the carrier pivots on a fixed shaft, allowing it to be turned back under the belt and laid down on the decking, thus permitting each unit to be examined and repaired, if necessary, while the belt is in operation. The return carriers are made of 7-in. tubing with a through live axle and supported at each end on the same bearings in the same mountings as used in the troughing carriers.

After selecting the carriers it was decided that none

of the drives submitted in the original proposals from the manufacturers were satisfactory, and another drive was designed in the company's office which would answer the purpose, new bids being obtained based on this design.

The motors, which were purchased from the General Electric Co., are of the wound-rotor type, 2,300-volt, 3-phase, 60-cycle, 900 r.p.m., the driving pulleys being required to make 40 r.p.m. The motors were to be set in separate drive rooms located back in the coal, and it was very desirable to take all gears out of the main gallery in order to conserve space and remove all possible hazards in operation. A double reduction gear box was designed as a unit to be installed in the motor room between the motor and the tandem driving pulleys. These pulleys were connected to the gear-reduction unit by two extension shafts fitted at each end with flexible couplings of the rubber-bushed pin type to allow for errors in alignment. Cut-steel herringbone gears of small diameter and wide face were used, and all shafts were mounted on high-duty Hyatt bearings.

This construction was adopted in order to get the highest possible efficiency from the drives and to allow



Rotary Dump Discharges 35- to 40-Car Trip

Not an impressive illustration, but the dump is 374 ft. long and has a hopper beneath it holding 1,250 tons and thirty-four duplicate feeders which deliver coal to the belt as it is needed, preventing the overloading of the conveyor and providing, to a large extent, against underloads. Without such a stabilizer as this hopper and feeders the belt would travel empty quite a proportion of the day.

the entire unit to be made accurately at the factory, assembled, tested and shipped complete inside the gear box ready for erection in its room. All gears run in oil, and the roller bearings are equipped so as to be readily accessible for lubrication. The connections between the gear boxes and the motors are made with Falk-Bibby couplings. Seventeen duplicate units of this kind and three of similar construction, but for single drives, were used in this installation. This equipment was purchased from the Falk Corporation.

All drive and head pulleys are of 48 in. diameter, cast-iron, with split hubs mounted on 7½-in. diameter shafts. These shafts are carried by two 6x7-in. heavy duty Hyatt bearings in specially designed ball-and-socket housings. Heavy cast-iron bases are used to mount these bearings. In the erection these bases were accurately set to alignment and level, with no provision for adjustment. This worked out nicely, saving time and giving perfect satisfaction. All snub and tail pulleys are of 36-in. diameter, with 5½-in. diameter shafts, equipped with 5x4-in. heavy-duty bearings mounted in the same way as the larger ones.



The driving pulleys are lagged with 4-ply rubber belt. On the tandem drives the belt is laced underneath first, thus putting the clean side of the belt against the main driving pulley. Each drive has a take-up pulley weighted to apply about 2,000 lb. initial tension to the belt. Just ahead of each take-up pulley is a snub pulley which is provided with a solenoid brake to stop the conveyor and hold it in case there is sufficient lift to cause it to run backwards after the power is shut off. The Stephens-Adamson Mfg. Co. supplied this equipment.

After this type of equipment was selected a complete conveying system was obtained on which every bearing was either of the ball or roller type and the lubrication taken care of as carefully as possible throughout the entire system. The large roller bearings required in the drives added considerably to the expense of the installation. By this refinement an actual saving in the installation cost was expected, and basing the figures on this class of equipment the figures shown in Table II were prepared which, when compared with those in Table I, show that it was possible to reduce the ply of the belt required from a ten-ply in a large part of the system to a uniform eight-ply throughout the entire system. This reduced the cost of the belt on the entire installation about \$50,000, paid for the bearings and more than justified expectations in regard to reduction in power, as will be shown later.

To provide for lubrication, every bearing in the system was equipped with an Alemite fitting. A special grease car has been built carrying a barrel of grease and a compressor for forcing it through a flexible tube which reaches all the bearings. By the use of this car all equipment can be lubricated at any time. This allows fixed periods to be set between complete lubrications of the equipment. Everything is so arranged throughout the system that every bearing can be lubricated with a standard grease gun while the conveyors are running, if this should ever be necessary.

After taking care to reduce friction to a minimum in all the mechanical equipment, the fact that friction just as serious may be developed within the load carried was not disregarded. In case the belt is flattened out at any place the load loses its form and must be forced back to its original shape in going through the next carrier. This requires power and may readily

Table I—Tentative Description of Colonial Transportation System

With Calculated Power Requirements and Belt Tensions Without Anti-Friction Bearings

Belt No.	Width, In.	Capacity, Tons	Drive	Length, Ft.	Rise or Drop, Ft.	Start Hp.	Running, Hp.	Belt Ply	Belt Tension, Running, Lb.	Unit Stress, Lb.
1	48	1,220	Single	800	— 2.25	248	80	8	8,889	35
2	48	1,220	Single	417	+ 8.1	140	54	8	6,000	31
3	48	1,220	Single	320	+ 4.5	106	39	8	4,334	23
4	48	1,220	Tandem	1,029	+ 19.6	347	132	8	9,680	38
5	48	1,220	Tandem	1,101	+ 19.6	369	139	8	10,193	40
6	48	1,220	Tandem	1,497	Level	470	157	10	11,513	40
7	48	1,220	Tandem	1,401	— 12.23	425	132	8	9,700	38
8	48	1,220	Tandem	1,500	Level	470	157	10	11,513	40
9	48	1,220	Tandem	933	+ 11.25	306	111	8	8,140	32
10	48	1,220	Tandem	1,413	+ 11.2	457	161	10	11,807	42
11	48	1,220	Tandem	1,513	+ 2.72	478	161	10	11,807	42
12	48	1,220	Tandem	1,321	+ 19.12	438	161	10	11,807	42
13	48	1,220	Tandem	1,324	+ 23.6	444	167	10	12,247	44
14	48	1,220	Tandem	1,342	+ 21.07	444	167	10	12,247	44
15	48	1,220	Tandem	1,296	+ 23.87	444	167	10	12,247	44
16	42	860	Tandem	1,263	+ 26.3	302	116	8	8,507	34
17	42	860	Tandem	1,366	+ 17.47	302	116	8	8,507	34
18	42	860	Tandem	1,214	+ 30.47	302	116	8	8,507	34
19	42	860	Tandem	1,278	+ 24.97	302	116	8	8,507	34
20	42	860	Tandem	1,212	+ 30.67	302	116	8	8,507	34

\* Stress in lb. per in. of width per ply.

become a source of increased power consumption. In order to avoid this, the load must be carried along in a perfectly quiet state with absolutely no changes in its physical form. To accomplish this, all changes in grade over vertical curves were made of as long radius as possible, using troughing carriers throughout the entire top run. Carrier spacing was fixed at an average of 3 ft. 6 in. with graduated spacing from the head to the tail end. Various other spaces were tried on a few conveyors, but no accurate data have yet been obtained. In the erection of carriers, marks were set on the steel stringers on each side at right angles to the center line of the belt to insure accurate spacing and alignment of carriers. All carriers were clamped to the steel stringers in order to allow of readily changing the spacing.

The belt for this system is 8-ply, 32-oz. duck, A-in. rubber-covered, with the exception of one of the shuttle conveyors, the 60-in. feeding belt, No. 20, under the dumping hopper and belt No. 19, which are fabric belts manufactured by the Imperial Belting Co. The other belts are divided nearly equally between the Goodrich and Goodyear rubber companies.

It was recognized that, on a system as extensive as

Table II—Belt Data for Accepted Scheme, Compiled Before Installation, Assuming Use of Anti-Friction Bearings

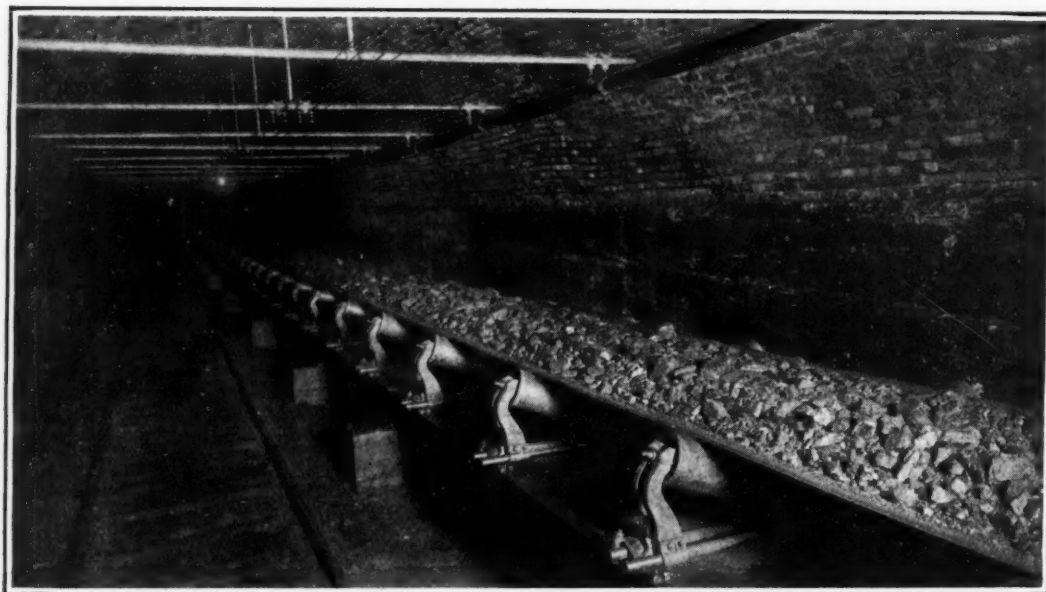
Belt No.	Length Between Centers, Ft.	Net Rise or Drop	Estimated Running Parts Empty—Tons	Estimated Weight Coal @ 1,220 Ton Hr.—Tons	Estimated Running Parts Loaded—Tons	Tension Load Carried by Pulley Bearings—Tons	Hp. of Empty Conveyor	Hp. to Raise Live Load	Running Hp. without Lift	Total Running Hp.	Hp. of Electric Motor	Start Hp. Empty 15 Sec.	Start Hp. Loaded 15 Sec.	Initial Tension	Belt Tension Running—Lb.	Belt Tension Start 15 Sec. Loaded—Lb.	Estimated Travel of Loaded Belt to Stop	Lineal Ft. of Belt Required—Net	No. of Carriers Required	No. of Return Rollers
1	786	43.42	37	31	68	17	11	+60	51	111	150	70	200	1,500	8,050	13,350	23	1,636-6	225	78
2	417	8.30	20	17	37	9	17	+12	28	40	50	39	87	2,000	4,320	7,210	35	867-6	120	41
3	321	4.85	17	15	30	9	5	+7	23	30	50	32	69	1,500	3,240	5,580	38	675-6	92	32
4	1,029	19.88	45	41	86	19	15	+27	65	92	125	87	204	1,500	6,950	13,660	35	2,113-6	294	102
5	1,101	21.07	47	44	91	20	16	+29	69	98	125	91	217	1,500	7,290	14,390	35	2,258-0	315	110
6	1,496	4.20	60	60	120	24	21	+6	91	97	150	117	234	2,000	7,740	17,100	46	3,047-6	428	149
7	1,402	-12.23	57	56	113	24	20	-17	114	97	150	111	245	2,000	7,800	16,610	43	2,858-0	401	140
8	1,500	1.47	60	60	120	25	21	+2	91	93	150	117	250	2,000	7,540	16,900	48	3,055-6	429	150
9	938	11.09	42	37	79	18	14	+15	59	74	100	81	176	1,500	5,840	12,000	40	1,931-0	268	93
10	1,410	12.33	57	57	114	23	20	+17	86	103	150	111	254	2,000	8,220	17,110	40	2,875-0	403	140
11	1,514	3.26	61	60	121	25	22	+5	92	97	150	120	255	2,000	7,710	17,150	47	3,082-0	433	150
12	1,320	29.64	54	53	107	23	19	+40	81	121	175	105	262	2,000	9,230	17,580	32	2,695-0	378	131
13	1,326	22.89	55	53	108	22	19	+31	81	112	175	107	254	2,000	8,690	17,110	35	2,707-0	380	132
14	1,342	24.42	55	54	109	22	19	+33	82	115	175	107	258	2,000	8,870	17,370	35	2,740-0	384	134
15	1,296	25.36	54	52	106	22	18	+35	80	115	175	104	253	2,000	8,810	17,080	34	2,648-0	371	129
16	1,263	27.92	53	50	103	21	18	+38	77	115	175	103	250	2,000	8,850	16,880	33	2,582-0	361	126
17	1,366	19.12	56	55	111	23	19	+26	84	110	175	109	255	2,000	8,540	17,200	37	2,788-0	391	136
18	1,301	34.04	54	52	106	22	18	+46	80	126	175	104	265	2,000	9,510	17,780	31	2,659-0	372	130
19	1,244	36.19	52	50	102	21	18	+49	77	126	175	101	260	2,000	9,500	17,460	30	2,542-0	356	124
20	538	20.20	31	34	65	10	11	+27	34	61	100	35	103	3,000	8,250	11,820	14	1,151-0	197	54
21 & 22	60	One 15 and one 5 hp. electric motor to each																268-0		
Total	22,930	357.42								1,933								47,080-0	6,598	

this, mechanical belt splices would be a serious handicap, and so the question of vulcanizing them in the field was discussed with the belt manufacturers. Three of these units required over 3,000 lin.ft. of belt and the average was about 2,000 lin.ft. Due to limited headroom in the belt gallery a roll of belt more than 700 ft. long could not be handled, and most of them were nearer 500 ft. long. The entire system required a little over 47,000 ft. of belt, making over 100 splices in the entire system. A portable electric vulcanizer was developed by the Goodyear Tire & Rubber Co. for this job. The vulcanizer was purchased and contracts made with both the Goodyear and Goodrich rubber companies to make vulcanized field splices on their own belts with this equipment, leaving only one mechanical splice in each belt which it was purposed to vulcanize later after the belts had stretched.

This is one point where the calculations went astray.

kind required careful consideration. They must be necessarily interlocked to operate as a unit, and a certain amount of flexibility must be maintained. The control is located in the No. 1 drive room at the river. An operator is stationed at that point to control the entire system and take calls from the various patrolmen. All units are connected with this room and the office by telephone, and instructions can be issued by telephone from either the office or control room to any drive room as needed. The operator can start or stop the entire system by simply pressing a button in this room.

On one panel of the board is mounted a voltmeter which indicates at all times which belts are running and allows the operator to know at a glance where trouble is located, if any should occur to stop a conveyor. The control panels are interlocked so that by cutting out resistance at each motor room as the last accelerating contactor goes in, the reading on the volt-



#### Belt at Colonial Mine

All the belts are 48-in. wide except No. 20 which is 60 in. wide. It will be noted how the carriers are supported, so that they can be turned over on the decking while the belt is running and can be cleaned or repaired. It is remarkable how certainly the coal stays on the belt. Not a lump rolls to the floor. Its motion along the road is one of translation only. The belts carry 1,500 tons per hour at a speed of 500 ft. per minute.

Over one million tons of coal have been carried on these belts and none of them have stretched over 2 or 3 ft., which does not allow enough belt to make a vulcanized splice. In this time of operation the original mechanical splices have had to be cut out on each belt and renewed once. The vulcanizing is well justified, and preparations are now being made to vulcanize all these splices by the addition of a short piece of new belt and a double splice. In making these splices originally the ends of the belts were stepped down in the factory and vulcanized after the belts were placed on the carriers. This was a successful undertaking and has eliminated much trouble in operation.

The first power analyses, as shown by Table I, disclosed the fact that, with instantaneous starting, the power to start would be about three times that of running. As the conveyors used for these determinations were driven by direct-current motors, tests were made of delayed starts by making contacts through a barrel of water and timing the start while measuring the power. From these data it was decided to specify as long a starting duty as possible on the controls to the motors. This was worked out so as to get a 15-sec. starting duty, which reduced the starting power to about twice that for running the loaded belt. This not only aided in keeping down peaks on the power demand, but materially reduced stresses on the equipment.

The electrical control for a system of belts of this

meter is increased to show the conveyor in operation. When conveyors are stopped, this process is reversed.

When the belts are loaded from the dump to the river and a start is to be made, the operator simply presses the main control button and conveyor No. 1 starts, and as soon as it reaches full speed, or in about 15 sec., No. 2 automatically starts, attains full speed, and No. 3 starts, all conveyors continuing to start in the same manner until the entire system is operating. This manner of starting prevents building up a peak load, allowing the entire system to be started without any excess over the regular running load, with the exception of the extra starting load on the last conveyor.

The equipment is so interlocked that if any motor is shut down at any place in the system, every conveyor back of it is automatically stopped instantly. This stop may be caused automatically by a line contactor of any starter opening due to overload, by the breaking of a conveyor belt, or by a belt slipping on one of the driving units more than a predetermined amount. In case of power failure, all motors will stop and will not start again upon return of voltage, but the system must again be started from the main control room.

Each conveyor is provided with a limit switch operated from the idler pulley of the belt takeup, so that if the belt stretches beyond a certain point or breaks, the motor will be shut down and all motors back of it will be shut down at the same time. An emergency



switch is located in the belt gallery near each motor room, which, if opened automatically, stops all motors. All these switches must be closed before the accelerating equipment will be operative. Each starting panel is provided with a switch by which it may be disconnected from the master control system and operated as a unit if required in case of testing, splicing a belt or any other cause requiring such operation.

In making a stop these belts will naturally coast varying distances due to the difference in lengths and lifts, and while solenoid brakes are provided on each conveyor, it was not considered advisable to set them so that they would engage hard enough to bring the belts to an immediate stop. To prevent a free-running conveyor from discharging coal upon one ahead which had stopped, a mechanical interlock was installed between the head and tail pulleys of each conveyor on the system. This engages whenever the conveyor at the rear tends to run faster than the one ahead of it and prevents any piling up of coal in the chutes. As all these safeguards are working satisfactorily, we have never had any trouble with these conveyors.

#### CHUTES LOAD UNIFORMLY

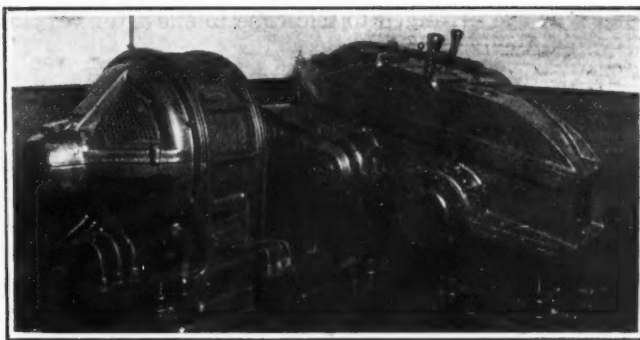
The designing of the chutes between conveyors gave much trouble as the headroom has to be kept to a minimum. The large lumps sometimes clogged the chutes a little as originally designed but this was easily corrected by cutting a V-shaped notch at the bottom. The chutes now load the conveyors uniformly throughout the entire system.

It required better than ordinary provisions to transfer this large coal tonnage from mine wagons to the conveying system. With the mine car in use, over 4,000 cars have to be dumped daily. The original scheme contemplated dumping two cars at a time with three dumps. This required large landings for empty and loaded cars and a large number of men for handling cars and dumps.

Consideration of this scheme developed a plan of consolidating this work all at one point and dumping entire trips of thirty-five cars each in a revolving dump. This scheme reduced the track for landings 18,000 lin.ft., the number of mine cars by 238, and the number of men required by eight. This scheme was adopted and the landing laid out with two 35-car rotary dumps, each 374 ft. long, set over a bin of the same length with a capacity of 1,250 tons. This gives a storage of one hour between the mine and the conveying system without tying up mine cars.

In the case of each mine, when a motorman arrives at the dump landing with a loaded trip, he cuts off at the head end, runs around the trip, pushes it on the dump where it is turned over at once, and when righted he couples to the empty cars and returns with his empty trip to the face, with a delay of only a few minutes. By this arrangement, for short periods, loaded trips up to three times the rated capacity of the conveying system can be taken care of as they come in.

The bin under the dumps will hold sixteen loaded trips, and with the conveyors running this allows a rapid handling, thus eliminating delays on the haulage system and also keeping all mine cars in motion practically all the time except when being loaded. The coal from Colonial Nos. 1 and 3 enters the dumps from one end, each normally using the dump on its own side, and No. 4 enters at the other end, using whichever dump happens to be empty when the trip arrives. Block sig-



**Double-Reduction Gear Box and Motor Set**

The driving equipment is set in rooms made in crosscuts adjacent to the conveyor, thus keeping all gears out of the main gallery. This conserves space and removes all possible operating hazards.

nals notify the motormen when each dump is clear.

One man handles both dumps and takes care of the signals. The dumps are rotated by compressed air, three 17-in. diameter cylinders being used for the over-turning and two for the reversing of each dump. Power is applied from these cylinders to the rotating cage structure through long H-beam sections and short lengths of wire rope. This eliminates the unequal stretch of long and short ropes used simultaneously.

Belt No. 20, which is 60 in. wide, extends under this hopper and is fed by thirty-four apron feeders which are all in operation at the same time and so designed as to feed a regular tonnage to the belt according to the speed at which they are set to operate. They are all driven by a single variable-speed motor, each individual feeder being driven from a line-shaft which is direct-connected to the driving motor.

Chains from this line-shaft drive worm-gear reducers which, in turn, drive each of these feeders. These multiple feeders give a very even load on the conveying system and, due to the light duty on each, should have a much longer life than could be expected where large tonnage is fed over a single feeder. In conveying 8,500 tons per day, each feeder handles only 250 tons per day.

#### DISCHARGES AT RIVER TIPPLE

At the river or discharge end of this conveying system, a large river tipple was built. The coal when discharged from No. 1 belt passes over a long bar screen with bars spaced to pass coal of a desired size. All small coal is collected in a chute which feeds a shuttle conveyor distributing it uniformly over the entire length of a slack-coal bunker.

The coal passing over this screen is fed to a duplicate shuttle conveyor which distributes it over the lump-coal bunker. These shuttle conveyors are either manually or automatically operated, as desired, and so interlocked with the main system as to start always with the other belts, thus preventing any flooding of coal at the start. Each has a capacity of 1,000 tons per hour, allowing for variations in the quantity of slack in the coal such as at times will occur.

The bunkers are of the suspended type, being suspended over the river from heavy girders resting upon six large concrete piers. Each of these bunkers has a capacity of about 1,200 tons. Coal is taken from the bottom of the bunkers through eight gates spaced so as to feed coal uniformly to a barge 175 ft. long. This allows each barge to be completely loaded without moving. A barge of 850 tons capacity can easily be loaded in ten minutes. The chutes leading from the gates to

the barge are arranged to telescope to allow for varying heights of water in the river.

The gates and telescoping chutes are all operated by electric motors which are centrally controlled in a cabin located beneath the bin where the operative has a clear view of all operations. The gates are opened by torque motors which hold them open as long as the electric current is kept on them. They are counter-weighted so as to close automatically as soon as the current is cut off. Thus in case of power failure the gates immediately close. The operator can open or close all gates at once, or any individual gate or number of gates by simply pressing the proper buttons on his board. A small barge-mover for handling both empty and loaded barges is also operated from this same board. A large reinforced concrete ice-breaker protects this harbor in which space is provided for storing ten empty and ten loaded barges.

#### CONVEYED 9,426 TONS IN ONE DAY

With this general description of the conveying system and its feeding and unloading arrangements, let us look at it briefly from the operating standpoint. It was started in regular operation April 12, 1924 and up to the present time has carried a little over one million tons of coal. The largest day's production up to Nov. 15 was 9,426 tons. The production during the month of October indicates that by this equipment it will be possible to obtain the production contemplated. The power requirements for the month were 0.363 kw. per 100 tons per 100 ft. level or equivalent.

The total power used for operating the conveying system, pumps, fan, and charging storage-battery motors, including transformers and line losses was 338,000 kw.-hr., of which 250,000 kw.-hr. were required for the conveying system.

In the months of August and September power tests were run on all these conveyor units. Each test was for an entire day, and accurate power readings were taken, the time the belt operated loaded and empty and the tonnage handled were recorded. The data shown by Table III is the result of this series of tests. At the time they were made the tonnage was less than is now being carried, but the results should be fairly representative of the power consumption.

From this data a formula has been prepared for cal-

culating the horsepower required to drive conveyors completely equipped with anti-friction bearings of the class being used. This formula applies only to 48-in. belt conveyors of long centers. It is divided into three parts, the power to drive a belt conveyor empty, plus the power to carry a given tonnage a horizontal distance, plus the power to lift this tonnage a given height.

The first part, or empty-belt power, is one of friction, both rolling and bearing, and is not exactly proportioned to length because the loads and belt stresses carried by main bearings are practically constant regardless of length, whereas the carrier rims and belt weight are directly proportional to length. We find from these tests that lift has practically no influence on the power used by a belt conveyor running empty. On conveyors such as are used in this system, the lengths and conditions are so nearly constant that the power per 100 ft. of conveyor is almost uniform, and in this formula we have taken the constant  $K$  which represents the power per 100 ft. of conveyor directly from the data as tabulated. This constant presupposes that all parts of the equipment are in first-class condition.

Its average value on all conveyors in the system having tandem drives is 2.11 kw. or about 2.5 hp. For safely estimating power the value recommended is  $K = 2.8$  when figuring the horsepower of conveyors of this class. The power for an empty conveyor where  $K =$  constant representing conditions and class of equipment, and  $L =$  length of conveyor in feet between centers of head and tail pulleys is given by:

$$\text{Empty Power} = \frac{KL}{100}$$

The second portion of this formula represents the resistance of the live load added to the empty belt which is simply bearing friction and rolling friction of this additional load on the carriers. This portion of the power is directly proportional to the length of conveyor and the tonnage carried and can be expressed as follows:

$$\text{Power for Live Load} = \frac{CTL}{100 \times 100}$$

Where  $C =$  constant power required to carry 100 tons 100 ft.;  $T =$  tons per hour and  $L =$  length of conveyor in feet.

The last portion of the power takes into considera-

Table III—Data Regarding Belt Tests at Colonial Mines

Belt No.	Length in Ft.	Lift Ft.	Tons Carried Day of Test	Total Kw.-Hr. for Day	Time That Belt Ran, Min.	Time That Belt Carried Load, Min.	Average Load Tons per hour	Kw. Demand for Empty Belt	Added Kw. Above Empty Demand to Carry Average Load	Kw. to Lift Load Average	Constant Kw. per 100 Tons per 100 Ft.†			
											Level Belt*		Empty Conveyor	
											Kw.	Hp.	Kw.	Hp.
1	786	43.4	6,346	460	368	352	1,080	19.2	51.6	39.8	11.8	14.2	0.139	0.167
2	417	8.3	6,418	174	360	327	1,180	12.8	14.1	8.3	5.8	7.0	0.118	0.142
3	321	4.8	6,460	144	350	326	1,192	12.8	9.3	4.9	4.4	5.3	0.115	0.138
4	1,028	19.9	6,500	410	395	350	1,115	24.0	35.0	18.9	16.1	19.3	0.140	0.168
5	1,100	21.1	6,854	420	390	333	1,235	27.0	36.7	22.2	14.5	17.5	0.105	0.128
6	1,496	4.2	7,122	410	370	350	1,222	31.1	29.0	4.4	24.6	29.5	0.134	0.178
7	1,402	—12.2	6,884	330	395	389	1,060	28.8	17.5	—11.0	28.5	35.2	0.192	0.230
8	1,499	1.5	6,750	400	415	361	1,120	28.8	27.9	1.4	26.5	31.8	0.158	0.189
9	939	11.1	7,032	358	376	361	1,142	25.6	26.0	10.8	15.2	18.2	0.142	0.170
10	1,410	12.3	7,883	440	389	354	1,336	24.0	37.0	14.0	23.0	27.6	0.122	0.147
11	1,513	3.2	7,250	400	388	359	1,212	28.8	30.2	3.3	26.9	32.2	0.146	0.176
12	1,321	29.6	7,271	530	375	340	1,282	32.0	52.0	32.3	19.7	23.6	0.116	0.139
13	1,325	22.9	7,252	480	374	342	1,272	26.5	47.2	24.8	22.4	26.9	0.132	0.159
14	1,342	24.4	7,085	490	377	345	1,232	26.0	49.0	25.6	23.4	28.0	0.141	0.169
15	1,296	25.4	7,341	500	367	334	1,320	24.0	49.9	28.5	21.4	25.7	0.125	0.150
16	1,263	27.9	7,939	430	400	350	1,362	26.4	50.1	32.3	17.8	21.4	0.103	0.124
17	1,366	19.1	6,225	440	355	340	1,100	26.0	42.0	17.9	24.1	28.9	0.160	0.192
18	1,301	34.0	7,235	520	370	363	1,196	24.0	53.3	34.6	18.7	22.5	0.120	0.144
19	1,243	36.0	7,847	650	375	353	1,334	28.8	71.7	40.8	30.9	37.1	0.186	0.225
20	558	20.7	7,421	307	440	283	1,575	12.8	48.7	27.8	20.9	25.1	0.238	0.285

\* Demand measured as additional power above empty demand. Difference between preceding columns. † Based on two preceding columns.



tion the direct work of raising this load a given height with an allowance for electrical and mechanical efficiency. This can be expressed as follows where  $H$  = height of lift in feet;  $D$  = constant due to efficiency:

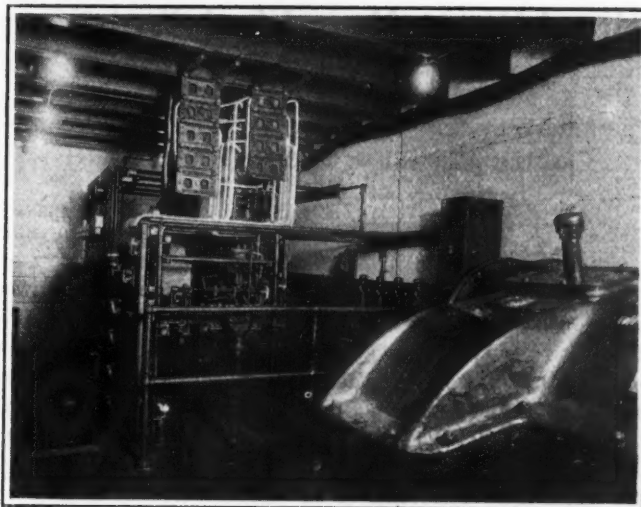
$$\text{Power for Lift} = \frac{DTH}{1,000}$$

Assembling these various components we have for driving conveyors of long centers with tandem drives with all bearings of high class anti-friction type:

$$\text{HP.} = \frac{KL}{100} + \frac{CTL}{10,000} + \frac{DTH}{1,000}$$

For conveyors of this class the value of the constants for figuring horsepower of conveyors is as follows:  $K = 2.8$ ;  $C = 0.18$  and  $D = 1.12$ . This gives safe data for estimating power requirements on conveyors of this class.

Summarizing, it has been found that a conveyor is dependable in its operation; positive in its performance; durable to an extent greater than most machines; less hazardous to life, and not entirely dependent upon the human element. It requires few men to operate; is not excessive in first cost, and has low operating charges.



**Typical Inside Switchboard and Starting Panel**

To the right in the foreground is the speed-reduction gear. There are three incoming lines on the system any two of which could furnish the whole installation. All motors are 2,300 volt, 3-phase, 60-cycle, 900 r.p.m. and of wound-rotor type. The entire system is controlled from No. 1 motor room.

## Nunnery Mine Accident May Lead to New Laws Relative to Inclines

Seven persons were killed, fifty-five were injured, eight seriously, when a rope on a 1-in-9 incline broke, Dec. 3, 1923, at the Nunnery Colliery near Sheffield, England. A report on the accident recently has been made by Sir Thomas H. Mottram, chief inspector of mines.

The rope was used for bringing coal cars out of the mines, returning them empty, hauling men from the mines and lowering them into the workings. The haulage rope passes to the surface through 4-in. cast-iron pipes which run down the brickwork lining of the shaft. A rope passed from the front car over the top of the trip to the back car to connect the wagons in case any of the couplings broke, and in hauling the cars up the incline a drag was put on the last car. An "authorized person" rode on the trip whenever persons were being hoisted or lowered. No one was allowed on a trip in which coal was being hauled.

On the day of the accident, the set of forty-four wagons of which forty-two were for riding purposes, known as the "Paddy Mail," were attached to the rope, and some 120 persons entered the cars to ride down the incline. The "authorized person," Colin Chappell, passed his knife eight times over the two signal wires to show that the men were in the cars and then four times to order the enginemen (there were two when men were being transported) to lower them slowly. They were usually lowered at a speed of only three miles an hour. For about 40 yd. they proceeded at that speed, but at the end of that distance they began to travel much faster. Chappell gave the four-ring signal again, but the enginemen interpreted it as one ring which required him to stop the trip and this he did. But he had barely done so when the rope parted and the man trip plunged down the incline and left the track at Cain's junction, 377 ft. below the starting place.

When hauling coal only 34 to 36 cars were used, and the average load was  $28\frac{1}{2}$  to  $30\frac{1}{2}$  tons. When hauling men the car at each end was filled with scrap iron to stabilize the trip, but the dead weight on the rope was only 19 tons. Nevertheless the rope broke, showing

that having pulled a larger load just prior to the lighter man-trip did not insure the men against an accident. The factor of safety with the new rope when lowering coal was 10.3; when raising coal 6.3; when lowering the men it was 14.8 and when raising them 9.0. Tests on the old rope that had been  $19\frac{1}{2}$  months in service showed that when lowering coal the safety factor was 5.9; when raising 3.6 and when lowering men it was 8.5 and in raising them 5.2. Other ropes had lasted two years.

Whenever a new length was added to the rope a corresponding length was cut from the capel end. By this process the oldest part of the rope was between the capel and the first splice. It was here the rope broke at a point 70 yd. from that splice and 230 yd. from the capel. The rope had been inspected  $2\frac{1}{2}$  hr. before the accident. An inspection seemed to indicate that eight interior wires in three adjacent strands had broken prior to the accident suggesting that the rope had been injured. Only two interior wires had corroded. There was a slight rust throughout but "no excess of corrosion." At the point of fracture the rope had been reduced about 40 per cent in effective area. The cable had been tarred weekly, had received a thorough weekly examination and was inspected daily to detect broken wires, a workman allowing it to run through his hand, a piece of hemp bagging or cotton waste being used to protect the hand from injury. The rope was recapped once a month.

It was shown that, when examinations were made and two or three broken wires were found in one strand, no report was made of the injury to the rope, but a splice of new rope was inserted. No report was made or action taken where only a single wire was broken. The chief inspector said that this practice might have kept the management from learning of the gradual deterioration of the rope, and stated that reports of this character should be made. He declared also that ropes used for the haulage of persons on inclined planes should not be spliced and that such ropes should not be used over eighteen months. He urged that an effective safety device to arrest cars, should the rope break, be placed on every man trip on an inclined plane and that the provision of a separate road for the haulage of men should receive the attention of mine managers.

## Steel-Plant Men Find Welding Has Wide Application

Thermit Welds Supplementing Arc and Gas Welds—  
Can Use Manganese Oxide to Harden Outer  
Surface—A 6,500-Lb. Weld

**I**F COAL-MINE mechanical and electrical men had attended the monthly meeting of the Association of Iron & Steel Electrical Engineers at the William Penn Hotel, Pittsburgh, Pa., on Dec. 13, they would have learned to what a large extent the various methods of welding are being utilized by the iron-and-steel industry to salvage broken and worn parts of electrical and mechanical machines. This meeting of the association was confined to illustrated descriptions of, and the technique entering into, scores of welding jobs which have been done successfully at the iron-and-steel plants in and about Pittsburgh. As W. L. Warner, of the General Electric Co., put it, "Welding equipment is the iron worker's needle and thread." Judging from what was said at this meeting, the steel plants make wider use of welding equipment than the coal mines.

Three processes of welding are in common use in the steel plants. Two of them, arc welding and oxy-acetylene or gas welding, are widely employed at our coal mines and need no further explanation. The third process, however, is seldom, if at all, used at the mines and should have applications similar to, and also different from, those covered by the arc-welding and gas-welding processes. The process in mind is "thermit welding." The term "thermit" is applied to a mixture of powdered aluminum and iron oxide.

Aluminum has a great affinity for oxygen. Consequently when it is mixed with an oxide of iron in a crucible and ignited by an agent such as a burning piece of magnesium ribbon, a chemical reaction takes place. The iron oxide is reduced to iron and the aluminum combines with the oxygen set free from the former and forms aluminum oxide. This reaction is exothermic and produces a temperature of about 5,000 deg. F. Consequently the iron and aluminum oxide are melted down during the change.

### CAN INCREASE TENSILE STRENGTH

These two products, not being miscible, separate into two layers. As the specific gravity of the molten iron is greater than that of the aluminum oxide, when the contents of the crucible are poured into a mold, the aluminum oxide rises to the top and does not form a part of the welded joint. The tensile strength of the iron in the joint thus formed is equivalent to that of iron laid by any other welding process. By the addition of oxides of alloy metals to the mixture the tensile strength of a welded joint can be substantially increased, and the composition of the welding material may be made similar to the metal being welded. Ten to twelve per cent of manganese oxide may be added to the thermit and it will form a hard outer surface on the welded area.

The thermit process may be used successfully for steel, wrought iron and cast iron. The procedure for each is about the same except that more care must be exercised so as not to overheat the cast iron while it is being welded.

H. D. Kelley, district manager of the Metal & Thermit Corp., Pittsburgh, Pa., described the uses of thermit

welding in the iron-and-steel industry for the reclaiming of broken and worn parts of machinery. The largest welding job ever made to his knowledge was the repair of a shear in a blooming mill of the Pittsburgh Steel Co. The break was so large that 6,500 lb. of thermit were required to effect the weld. He briefly described another interesting job: At one of the blooming mills of the Carnegie Steel Co. a broken crankshaft, of 27-in. diameter was reclaimed by thermit welding. In this job a new end was added to the shaft.

Mr. Candy, of the Westinghouse Electric & Manufacturing Co. and W. L. Warener, of the General Electric Co., described many steel-mill repair jobs in which the electric arc welder played the most important role. Don McCloud, consulting engineer of Chicago, described the manufacture of oxygen by the liquefaction method. Incidentally he mentioned the welding by oxyacetylene, in an oxygen plant, of a  $\frac{3}{4}$ -in. seamless tube pipe line which withstands a pressure of 3,000 lb. per sq.in. Mr. Applegate described the oxyacetylene welding of a 28-in. exhaust-steam line at one of the mills. He said the welding of joints eliminated rivets and rivet friction and allowed the use of a pipe line of smaller diameter.

### WELDING FOR MINE REPAIR JOBS

A list of a few of the many repair jobs that are made in steel mills by welding should convince our mine repair men of the value of welding. These are set down without further explanation, as follows: Shafts of all sizes and of various designs, including armature shafts; frames and housings on large and small machines; flywheel spokes; racks; gears and pinions—helical and spur—; hydraulic cylinders; pipe joints; locomotive frames; switch points, track frogs and crossovers; connecting rods; locomotive-wheel flanges; boiler flues and tanks of all kinds.

The meeting brought out the following facts that should be helpful to the repair men at the mines: Thermit mixture, the material used in thermit welding may be so composed that the product of chemical reaction in a weld joint is a metal which closely resembles the metal of the parts that are joined. Manganese oxide may be used in the thermit crucible or sprinkled on an area being arc-welded to produce a hard wearing surface, a suggestion particularly valuable to mining men who desire to build up worn switch points, frogs and crossovers. The addition of granular nickel to a weld may add as much as 5,000 lb. per sq.in. to its tensile strength. There is no practical limit to the application of welding methods. Its practicability extends from  $\frac{1}{8}$ -in. sheet steel to huge shafts and frames, for if a welded joint holds on a small job it should hold on a large one. Broken taps may be welded together allowed to cool and then backed out from the holes that are being threaded thereby saving much time. Extensive fractures in locomotive frames may be repaired by cutting out a section and joining the two ends by layers of steel plates welded together. Worn armature shafts can be built up without having to tear down the armature itself. Steel structural members in buildings are often joined by being welded instead of by riveting. This suggests a practice that might be followed in the erection or repair of tipples and other structures subject to vibration. A good welding job will generally give as long a life to a broken part as that possessed by a duplicate new part.



## West Virginia-Kentucky Electrical Men Present Their Problems and Experiences

Floating Battery Irons Out Frequently Recurring Peak—Such Accumulators Have Long Life—  
Use of Storage Batteries as Auxiliaries—How to Convert the Mine Foreman—  
Rotary Converter Versus Motor-Generator Set

BY A STAFF CORRESPONDENT

**S**PIRITED discussion characterized the fourth annual convention of the West Virginia-Kentucky Association of Mine, Mechanical and Electrical Engineers, held at Huntington, W. Va., Dec. 12 and 13. No exhibit was held in connection with this year's meeting but nevertheless there was a sufficient attendance at all sessions to make the convention a success.

In opening, R. R. Webster, of Weeksbury, Ky., who is president of the association, called attention to the unfortunate fact that at no time is it more difficult for men to get away to attend meetings than just when the mines most need to reduce the cost of production by improved and more efficient methods, and therefore when a getting together of the electricians and mechanics to iron out difficulties is most desirable they are either too busy to come or the company hesitates at the small expense that their attendance would incur.

The paper prepared by Byron B. Minnium, on voltage control in mines by storage batteries evoked

an interest which was evidenced by lengthy discussion. Mr. Kennedy, of the Electric Storage Battery Co., described two installations in Illinois mines. In one of these instances batteries have been used for three years to help handle the peak load caused by a main haulage locomotive pulling a trip up a short 4-per cent grade which is about 5,000 ft. from the shaft. For this purpose several old batteries, which have already served their best days in mine locomotives, are connected so as to float on the line taking charging current only when the load is light and delivering high current back to the line when the demand is heavy. The installation of this battery in the mine, near the point of heavy grade, raised the minimum voltage delivered to the 13-ton locomotive from 75 volts to 175 volts.

The other use of batteries which he described was at a mine which was shut down for a long period. This operation has its own power plant and is equipped with battery locomotives for gathering. By using the locomotive batteries to operate the fan and pumps it was necessary to operate the power plant but one day per week. On this day the batteries were charged and any necessary heavy work done, such as using locomotives for the general upkeep of the mine. The batteries had to be charged and care had to be given them regardless of use, so that the arrangement described did not incur any additional labor.

In regard to the life of a battery floating on the line, J. H. Markham, of Ronda, W. Va., called attention to the fact that batteries thus used should have a longer life than if incorporated in the frame of a mine locomotive. The floating battery being at a state of full charge most of the time, the tendency to sulphation and other deterioration of the plates would be reduced.

Replying to questions regarding the efficiency of a floating battery, and as to the highest discharge rates possible for short periods, Mr. Kennedy replied that a 92-per cent ampere-hour efficiency has been obtained in such service, and that discharge rates of 10 or 12 times normal rate are quite practicable.

E. W. Pardee, of Charleston, W. Va., inquired whether in any instances batteries are being used as auxiliary power sources for the operation of mine fans. Mr. Caverlee said that a 130-cell, 23-plate battery, after having been used at an Ohio mine as an auxiliary on a fan for over four years, was examined and found to have de-

teriorated but little during this long period of use.

A. F. Brosky, of Pittsburgh, described an installation in the Fairmont field where a cable was run through a borehole from the fan to the underground motor barn. In case of power failure a battery locomotive is ordered into the barn and connected, through the cable, so as to furnish power for the fan motor.

An important emergency use for which a locomotive battery should be kept in mind was described by Mr. Webster, this for excitation in a mine power plant where alternating-current generators are used. In getting generators back on the line after a shutdown, temporary operation of the steam-driven exciter is necessary. If at this time the exciter should break down, then a 40- to 60-cell locomotive battery can be used temporarily to furnish generator field until the motor-driven exciter is started.

At this point the discussion digressed to the subject of electrification of gaseous mines by storage batteries. The recent paper on this subject read at the West Virginia Mining Institute by John B. Hicks of the Consolidation Coal Co., formed the basis of this discussion. Using a large battery mounted on a truck and assigned to a mining machine for furnishing power for cutting is the radical departure which is attracting attention. The more important advantages, aside from the primary feature of being able to use electricity

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**T**HE LONG quarrel between the rotary converter and the motor-generator set was renewed at Huntington with a somewhat clearer understanding of the relative places of the two. From the discussion, it would seem that both have advantages which give them a place depending on the conditions that obtain at any given mine and that a decision cannot be made without due inquiry. At present power-factor correction is not as live a subject as it may be later should the power purchaser be penalized for failure to provide it. The lowering of cables is a subject about which the electrical men at Huntington seemed exercised.

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with greater safety in a gaseous mine, were recounted; these being, increased speed of cutting because of improved and constant voltage, elimination of delays caused by power interruptions, elimination of bonding expense, elimination of trolley wires, and reductions of peak loads which under certain rate schedules effects a large saving in the demand portion of the power bill.

W. H. Miller, Jr., called attention to the large investment in batteries which is necessary when power is to be furnished for cutting, gathering and hauling, and to the fact that in from three to five years the batteries will be worn out and the investment must be duplicated.

F. A. Signer, who was to have given a talk at the meeting on the methods of the electrical department of the Southern Mining Co., found at the last moment that he would be unable to attend, so he sent a message requesting the chairman to ask J. H. Edwards, who is familiar to a certain extent with their methods, to describe these in a general way. The Southern and associated companies hold, about twice a year, a meeting of their chief electricians. As many as possible of the mine foremen and superintendents also attend. The electrical department costs of each mine are reviewed and discussed. Each chief electrician is asked for a report covering his success or troubles with the different kinds of equipment in use at the mines, and concerning plans he has to propose for lowering the costs of electrical operation. Naturally many matters are discussed which concern the foremen and superintendents, hence the advantage of their being in attendance.

The foregoing account of the Southern Mining Co.'s methods was followed by a general discussion of the ways of obtaining closer co-operation between the mine foremen and electricians. R. R. Webster called attention to the fact that many mine foremen seem to forget that abuse of equipment and the resulting repairs add to the cost of coal at the mine and so reflect unfavorably on their management of the company's property. The days of "production regardless" seem to be over; this is a time of lower cost per ton.

The idea was advanced by F. M. Reigher, of Bluefield, that the mine electrician himself is to blame for much of the lack of co-operation of which he so often complains. The mine electrician needs to exercise more patience and perseverance. W. H. Milton, Jr., said that a large anthracite mining company has found that the holding of regular, combined meetings of electricians and mine foremen is the best way of impressing upon foremen the necessity for using more consideration in the operation of equipment.

Reducing costs by proper supervision of mechanical and electrical equipment was the subject of a paper read by J. H. Edwards. This was illustrated by exhibits and punctuated by citations of actual instances where electrical men effected appreciable savings in

production cost and of other instances where an opportunity to make a saving was not recognized until too late. J. H. Markham stated that, as a rule, the mine electrician is kept with his "face so close to the grindstone" that he cannot see and remedy many of the important opportunities that are within his grasp. A. F. Brosky recalled that the large steel companies found long ago that they can afford to spend more for inspection and engineering supervision of equipment than for actual repairing.

The importance of keeping in stock small inexpensive repair parts, which are difficult to obtain on short notice, was discussed by T. A. Martin, of the Peerless Coal & Coke Co., Vivian, W. Va. He cited a large coal company which, in order to facilitate ordering repairs, obtained from the equipment manufacturer duplicate name plates for each item of equipment, and filed these plates in the engineering office for reference. In regard to pump installations, Mr. Martin stated that slate falls on the pipe line close to a pump frequently broke the water-

end casting, so the Peerless company is now using a short length of hose adjacent to the pump, in both the suction and discharge lines.

H. H. Fletcher, manager of the Quincy Coal Co., Quincy, W. Va., said that he thought the greatest opportunity to make a saving in maintenance expense exists in periodic inspection and prompt repair of all the small items. He favors the purchase of insurance against electrical breakdowns. This causes more thorough inspection, and assures the company that faults when reported

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**S**TORAGE batteries have many other uses besides those of driving gathering locomotives. Their ability to help in meeting mine problems seems now to be receiving unusual attention as was evidenced by the discussion at the meeting of the West Virginia-Kentucky Mine, Mechanical and Electrical Engineers. As usual the inability of the mine foreman to visualize the importance of the careful use of electrical equipment was a subject of extensive comment. Nothing or little was said apparently about ineffective bonding. Is it to be concluded that this defect has been largely removed in the states principally represented? If so the companies whose electrical men were present are to be congratulated and their electrical experts to be commended. Would it were so everywhere!

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will be repaired promptly in order to avoid paying a penalty in the form of a higher premium.

The ordering of repair parts as soon as the need can be foreseen was urged by Mr. Pardee. Waiting until the last moment and then ordering an express shipment by telegram is expensive. An actual case was described where a new set of tires for a locomotive were ordered from the factory by express. These were needed to replace worn tires, and the need could have been anticipated a month, or perhaps, several months.

E. L. Hough of the General Electric Co. gave a short talk on automatic substations. This was followed by the showing of a new film illustrating installations in coal and salt mines. The step-by-step operation of the relays and automatic contactors was shown in detail. R. R. Webster inquired if satisfactory apparatus is available for the automatic paralleling of two machines located in the same substation. To this Mr. Hough replied that there is little difficulty in paralleling converters, but much difficulty in paralleling motor-generators which are over-compounded. The difficulty arises when a cold machine is added. As it warms up, the percentage of load which it carries will change materially unless the field rheostat is adjusted. A current balance regulator is now available which does this automatically.



F. M. Reigher stated that he had overcome the trouble of paralleling motor-generators, by using machines which are designed for flat compounding. He followed this discussion by reading an instructive paper in which the rotary converter was compared with the motor-generator. He carefully analyzed the characteristics of each and compared the costs of manual and automatic types. He stated that the overall efficiency of a converter installation is from 5 to 8 per cent higher than that of the motor generator. Except for the one big feature of power-factor correction, the converter seemed to get the best of the argument in the lively discussion which followed Mr. Reigher's paper.

Roscoe Woltz called attention to two advantages of the converter which were not mentioned. The pull-out torque is about 4 times the rated load, as compared to about  $2\frac{1}{2}$  times for a motor-generator. Also in case of the failure of a bearing, a replacement is readily made on a converter, but may be complicated on a motor-generator, because in a three or more bearing outfit the question of shaft alignment must be considered.

J. H. Edwards called attention to the necessity for an automatic field regulator on synchronous sets to maintain a desired power factor. Mr. Hough stated that two such automatic regulators are now in use at Pennsylvania mines.

Following the discussion of Mr. Reigher's paper, the subject of electric welding for shop repairs was considered. Mr. Webster described a number of useful applications and reviewed a year's experience in filling worn locomotive tires. His conclusion, based on his experience to date, is that welding tires does pay, but that the margin of saving is small, therefore the most economical methods must be used. He uses a  $\frac{1}{4}$ -in. diameter Wanamaker manganese-steel electrode, and grinds the filled-in surface by a home-made device which requires little attention.

Answering a question by Mr. Fletcher, as to the direction in which the layer of metal is laid, Mr. Webster stated that the beads are applied crosswise to the length of the tread. Mr. Markham said that

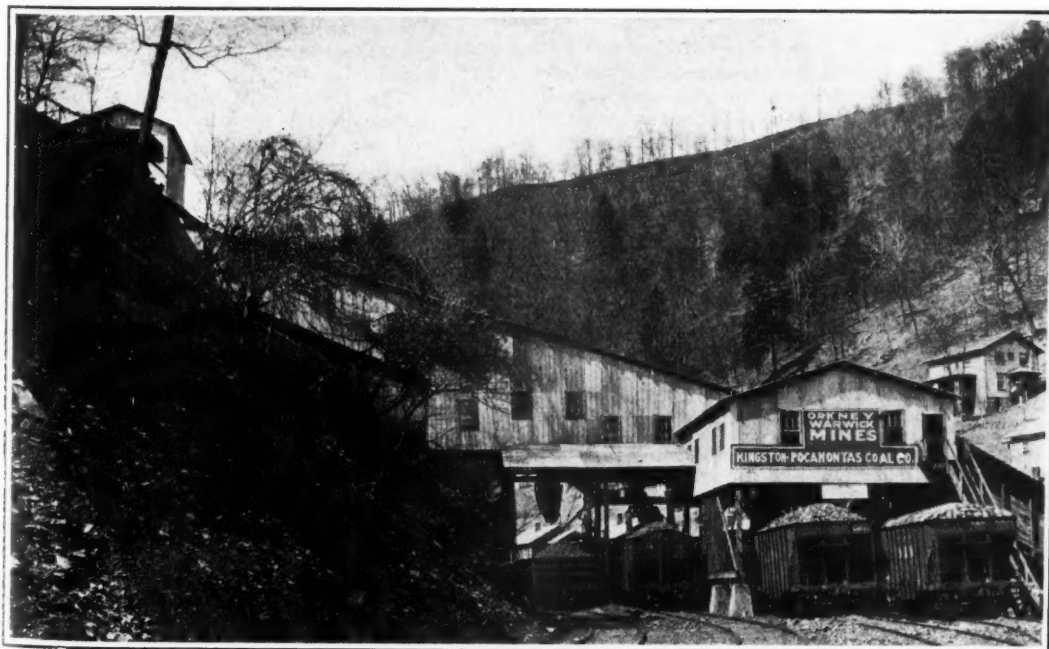
his experience indicated that in a plain sleeve bearing a built-up shaft seemed to wear just as little as, if not less than, the original material.

The discussion of correct methods of installing feeders in boreholes was opened by the reading of a paper written by E. S. Simpkins, of Pittsburgh, representing the Standard Underground Cable Co. He described their lead-covered, steel-wire-armored cable and the method of supporting it at the top of a borehole by a long clamp around the armor. For a cheaper installation a varnished cambric two- or three-braid weather-proof cable is recommended. He also advocated that it be supported by carrying it over a sheave of large diameter, or in case of high voltage that each conductor be tied to a separate strain insulator.

W. H. Milton, Jr., told how, in lowering jute-covered cables into deep boreholes trouble is encountered because the jute covering is pulled off by the impregnating compound causing the turns on the reel to stick together due to the weight and tension. This is overcome by ordering the cable without any compound in the jute covering, and then applying the compound to the cable, a few feet at a time, as it is lowered into the borehole.

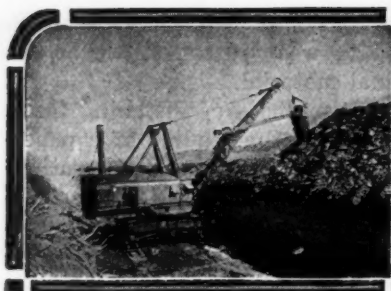
The meeting was closed by a discussion of the correct application of carbon brushes. H. C. Harker, of Huntington, representing the National Carbon Co., stated that abrasives are undesirable in brushes, however if the mica is not under-cut, a degree of abrasiveness is necessary. He described the arc type of slotting for commutators. With this type of slotting less dirt collects than with any other, but it requires special tools. Mention was made of experiments which are being made of using a varnish in the slots after cutting. It is believed that this will prevent oil or moisture from damaging the mica.

Mr. Webster condemned the deep, square-bottom slots cut by some manufacturers in their commutators. In the duty encountered in a mine, such commutator slotting often causes trouble due to the arcing in the bottom of the slot, which is a result of an accumulation of dirt, oil and moisture. H. H. Fletcher said that, in his opinion, there are no instances around the mines where proper slotting is not advisable.

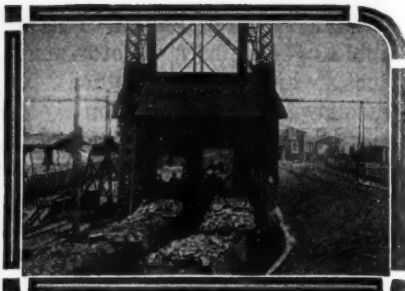


#### Orkney-Warwick Mine

This mine is located at Hemphill, McDowell County, West Virginia, about two miles from the business section of Welch in a westerly direction. It is one of nine operations of the Kingston-Pocahontas Coal Co., formerly the Solvay Collieries Co., a subsidiary of the Semet-Solvay Co., of Syracuse, N. Y. The coal is shipped over the Norfolk & Western R.R.



## News Of the Industry



### Green Named as President Of Federation of Labor; To Follow Gompers' Policy

William Green, secretary and treasurer of the United Mine Workers of America, was chosen on Dec. 19 to be president of the American Federation of Labor to succeed the late Samuel Gompers. Soon after his election Mr. Green announced that it would be his purpose to adhere to those principles of trade unionism so ably championed by Mr. Gompers and upon which the superstructure of organized labor rests.

Mr. Green's election took place at a meeting of the executive council of the Federation, held in New York City, and was unanimous. At the same time James P. Noonan, of the International Association of Electrical Workers, was elected eighth vice-president.

The new president of the Federation is 51 years old and lives at Coshocton, Ohio. He has been identified with labor organizations for many years and served at one time as president of the Ohio organization of the United Mine Workers. He has been secretary of the International organization since 1912, when he was appointed by John P. White to fill an unexpired term as secretary.

#### Feels Solemn Duty to Serve

Following his election Mr. Green said that he regarded it as a call to service, "and for that reason I feel it my solemn duty to accept and to serve."

Continuing, Mr. Green said that "the high standard of excellency in service, efficiency in leadership and administrative ability attained by Mr. Gompers during his long and useful career is a challenge to the best and highest of everything which any human being can give in the service of his fellow man."

"While organized labor feels most keenly the loss of the great leader, Mr. Gompers, every member may take courage and consolation from the fact that he left us a legacy of incomprehensible value. We have his trade union creed, his trade union philosophy, his writings, letters and recorded spoken words. All of this will serve as a guide in charting and shaping our course and in the formulation of our policies."

"In co-operation with my colleagues on the Executive Council of the American Federation of Labor and the chosen officers of all affiliated organizations we will carry forward the work of organization and education among the workers of our land."

"We will endeavor to promote collective bargaining, the observance of wage agreements and the acceptance of the organized labor movement by all classes of people as a logical, necessary moral force in the economic, industrial and social life of our nation."

"While striving for the attainment of these praiseworthy purposes we



William Green

Secretary and treasurer of the United Mine Workers of America, who has been chosen to succeed the late Samuel Gompers as president of the American Federation of Labor.

shall ever be mindful of our duties and obligations as American citizens. Our devotion to America and American institutions must never be successfully challenged. Our demand upon society for higher standards of life, better wages, independence and humane conditions of employment must ever be based upon our inalienable right to the enjoyment of life, liberty and the pursuit of happiness.

"Our problems must be met and solved upon the basis of American fair play and in accordance with American traditions and American ideals."

#### Wise Choice, Says Lewis

Later in the day John L. Lewis, president of the miners' union, who came to New York to attend the funeral of Mr. Gompers, issued a statement regarding Mr. Green's election in which he said:

"The election of William Green as president of the American Federation of Labor is the choice of wisdom. Mr. Green's long experience in the trade union movement, his undoubted talent

#### Hard On Hootch

Employees of the Colorado Fuel & Iron Co., which operates a steel mill at Pueblo, Colo., and 26 mines in various parts of the state, will be watching their steps hereafter. Those with thirsts or the where-withal to satisfy the thirsts of others will be especially watchful. The company has posted a notice warning that any employee caught buying or selling "moonshine" will be suspended from the payroll for the first offense and summarily discharged for any repetition, without waiting for a court verdict. The popularity of the Colorado Fuel & Iron Co. among "dry" has risen 8,000 per cent. Prohibition enthusiasts are writing letters to the newspapers about it, saying that if every employer in the country followed this company's example the Volstead law would be enforced.

for leadership and his prestige as a public spirited citizen are qualifications which insure the success of his administration. He is the one outstanding figure who can take upon himself the mantle of the revered Gompers and be assured of the co-operation and devotion of the great majority of the membership of the American Federation of Labor.

"His ascendancy to the position of president marks the beginning of a new era of constructive progress in the ranks of labor and his election will allay any public apprehension that the long established and proper policies of organized labor were to be seriously impaired."

"Mr. Green will enter upon his new duties under conditions which augur well for the future of organized labor and the proper protection of the public interest."

#### Green to Make Few Changes

Mr. Lewis announced that he will soon appoint a successor to Mr. Green as secretary and treasurer of the miners' organization. Mr. Lewis was a candidate for president of the Federation against Mr. Gompers in 1920.

Mr. Green said he intends making few changes in the personnel of the national headquarters staff. He will preside for the first time over the Executive Council at its meeting to be held in February at Miami, Fla.

Following the election of Mr. Green, James Duncan, who for thirty years has been a vice-president of the Federation, tendered his resignation. The resignation was tabled until the meeting at Miami.



## Connellsville Independents Return to 1920 Scale; to Fire 2,500 Ovens

A number of independent coal and coke operators in the Connellsville (Pa.) region on Dec. 15 announced a return to the wage scale of Sept. 1, 1920, the peak scale of the region. Some made the change effective immediately, the others making Jan. 1 the date for putting it into effect. It is probable that others will take similar action around the first of the year. Under the new scale, drivers in shaft mines, track layers and timbermen get \$7.55 a day and assistants \$6.55, with other mine work in accordance.

On the heels of this announcement came orders to fire up immediately 2,438 more ovens in the Uniontown district, giving 3,000 men employment.

Companies that made the new scale effective last week include W. J. Rainey, Inc., Hillman Coal & Coke Co., Connellsville Central Coal & Coke Co., Monessen Coal & Coke Co., Reliance Coke Co., Fayette Coke Co., Puritan Coke Co., Eastern Coke Co., Orient Coal & Coke Co., Republic Iron & Steel Co., Oliver-

Snyder Steel Co. and the Buckeye Coal Co. The Jan. 1 list includes the Snowdon Coke Co. and the Century Coke Co.

The Bourne-Fuller Coke Co., near Searight, was the last to cut wages and the first to go back to the 1920 scale.

The H. C. Frick Coke Co. has issued orders to fire the following ovens immediately: Leith, 300; Brownfield, 200; Dearth, 300; Leisenring No. 1, 500, and Youngstown, 250. W. J. Rainey, Inc., gave directions for immediate resumption at these plants: Allison, 493; Revere, 206, and Mount Braddock, 135.

On Dec. 12 the men at the Republic Mine of the Republic Iron & Steel Co. struck, demanding restoration of the Frick scale (the peak wage). The company thereupon closed the mine indefinitely and resumed operation at its Russellton No. 1 mine, in the Freeport field. The Hillman Coal & Coke Co. has resumed at the Pike Mine, a union operation at Brownsville, on the edge of the union field.

## Engineers to Co-operate in Reforestation Program

Studies of the forestry situation in the various states are to be made by national and local engineering societies under the direction of the American Engineering Council, which announces its purpose of working with the federal government to carry out the provisions of the Clarke-McNary Act.

The nation's timber resources are thinning so rapidly as to constitute a grave social and industrial menace, according to the Council. At a forum in Washington, D. C., Jan. 16-17, to be attended by delegates from all over the country, plans for nation-wide reforestation effort will be publicly discussed.

The Council has appointed a Committee on Reforestation, which has already begun the work of enlisting engineers in every state in a permanent organization whose investigations shall harmonize with the government's policy, according to the president of the Council, Ex-Governor James Hartness, of Vermont.

A survey has disclosed that fourteen states are without forest departments. The most heavily timbered of these are Florida, South Carolina, Georgia, Mississippi and Arkansas. Summarizing what is being done by the several states, a statement by the Council says:

"In November citizens of California will vote on a constitutional amendment placing immature forest growth on the tax exempt list for four years after planting.

"Wisconsin will vote on an amendment which provides for the participation of the state in acquiring, preserving and developing forests and for appropriating funds for this purpose within certain limits.

"In South Carolina a committee representing lumbering, agriculture and other industries is fostering the introduction of a bill providing for a state forestry department.

"Pennsylvania will vote in November upon the issuance of \$25,000,000 in bonds to be used for the purchase of state owned forests. A conservation council composed of interested organizations is ardently supporting this issue.

"The State Land Board of Oregon is expected to approve the exchange of numerous isolated sections of timbered school land for a single tract now under control of the federal Forest Service.

"Idaho chambers of commerce are campaigning for a state forest policy which will obtain federal co-operation under the Clarke-McNary bill. A similar activity is under way in Arkansas.

"In Georgia the Rowntree-Haddock bill, providing for a state forestry department and a forest fire protection system failed to pass in the last session of the Legislature. It will be introduced at the next session."

"The Council," said ex-Governor Hartness, "will enlist the co-operation of all interested organizations in every state in carrying on a campaign to effect the passage of such legislation and changes of forestry policy as will enable the state to co-operate fully with the federal government in carrying out the provisions of the Clarke-McNary Act."

## Supreme Court Denies Writ to Pennsylvania Mining Co.

The U. S. Supreme Court on Dec. 15 denied a writ of certiorari sought by the Pennsylvania Mining Co. to review a decision of the Eighth Circuit Court of Appeals in reversing and remanding for a new trial by the federal District Court at Ft. Smith, Ark., a suit brought by the company against the United Mine Workers of America and others.

This suit is a companion to the famous Coronado Coal Co. case. Alleging that the union had interfered with interstate commerce by obstructing operations at its mine in Johnson County, Ark., the Pennsylvania Mining Co. brought suit for triple damages under the Sherman anti-trust law. A jury in the District Court awarded \$100,000 in 1920, and judgment for treble this sum was entered. The union appealed. Meanwhile the Coronado case, along similar lines, went to the Supreme Court, which decided that interstate commerce had not been affected. On retrial of the Coronado case the lower court gave a verdict for the defendant union. The Coronado company appealed. Both this latter appeal of the Coronado company and the appeal of the union from the verdict in favor of the Pennsylvania company were argued before the Eighth Circuit Court of Appeals last July, as similar issues were involved. The Circuit Court of Appeals, affirming the decision dismissing the Coronado case—that company appealed again to the Supreme Court—reversed and remanded for a new trial in the District Court the case won by the Pennsylvania company, using the Supreme Court opinion in the original Coronado case as a precedent.

The petition of the Pennsylvania company for review by the Supreme Court was denied because the decree of the Court of Appeals was not a final judgment, the case having been remanded for further action in the District Court.

## Non-Union Competition Closes Florence Mine

With the ending of work on Saturday evening, Dec. 13, 250 miners employed by the Rochester & Pittsburgh Coal & Iron Co. at the Florence mine, Delancey, Pa., were thrown out of employment. When the men reported for work on Monday morning they found a notice posted at the mine announcing that the mine had been closed because the present union scale of wages made it impossible to compete with non-union mines.

The announcement was signed by the president of the company, B. M. Clark, who also is president of the Central Pennsylvania Coal Producers Association. Mr. Clark recently had several exchanges of letters with John Brophy, district union president, on the advisability of modifying the Jacksonville wage agreement in order to rehabilitate the coal industry of central Pennsylvania.

Every mine of the Rochester & Pittsburgh Coal & Iron Co. is now idle. Several months ago other mines were closed and the working was concentrated in the Florence mine, which is said to be a low cost mine. However, the company does not see its way clear to continue operating at a loss.

Officers of the company feel that if the United Mine Workers in the central Pennsylvania field would save itself from disintegration it must meet the operators of the district and agree upon a scale of wages that will enable the operators to meet competition. Otherwise it will only be a short time until none but open shop mines will be running and there will be no financial resources upon which the union may rely. Of the approximately 30,000,000 tons of coal produced in the field since April 1 of this year only a little over one-third came from the union mines.

### Hoover Peace Means Death For Pennsylvania Mining, Charles O'Neill Declares

"Unless production costs are revised, mining in central Pennsylvania may soon be a lost art," declared Charles O'Neill, secretary of the Central Pennsylvania Coal Producers' Association, in answer to Herbert Hoover, Secretary of Commerce whose aid was solicited in effecting a modification of the wage agreement obtained through his intermediation at Jacksonville, Fla. Mr. O'Neill declares that the peace Secretary Hoover seeks is the peace of death for the Pennsylvania operators and miners.

Continuing, Mr. O'Neill says: "Many of the mines in our district for nearly a year have been losing heavily. The operators have seen their markets torn away by other districts and have been able to hold old customers only by selling fuel at a price that is considerably less than the cost of producing it. Obviously, this course cannot be continued indefinitely.

"Secretary Hoover declares that eventually this will be beneficial to the industry, since he declares that many mines should be abandoned. We of the central Pennsylvania field do not feel that we should be the victims of the program. Neither do we believe that it will work out as Secretary Hoover predicts it will. For every mine that is closed in Pennsylvania a new mine is being opened in West Virginia and Kentucky. At the end of three years of peace there probably will be more mines and miners than there are today but they will be in the South.

#### Southern Mines Gaining

"Ten years ago central Pennsylvania produced 15 per cent of the soft coal consumed by this country. Today our production is about 8 per cent. In the same period production in the Southern field has increased tremendously. Today West Virginia and Kentucky are sending coal into Eastern markets formerly held by the central field. We believe the cross hauling is uneconomic to the highest degree. It imposes an unnecessary burden upon transportation facilities of the country and at the same time is an injustice to the central Pennsylvania operators, who have hundreds of millions of dollars invested in their plants.

"Coal is being produced in West Virginia at a cost so much under that produced in Pennsylvania that the operators in the former state can absorb the difference in freight rate to the great Eastern consuming centers and still undersell Pennsylvania coal.

"We contend that this is an unwise and uneconomic condition. Coal should be consumed at points as close as possible to the sources of production. If Secretary Hoover's program resulted in the elimination of mines and miners, it might have some justification."

Mr. O'Neill gives further reasons why the policy is wrong and continues: "We have endeavored to demonstrate to Mr. Hoover that it is contrary to sane national policy to drive coal mining out of a large section of Pennsylvania. The coal here is of exceptionally high grade and should be

### Maybe It Was a Pocket Of Gas

A new financial hazard for coal operators may be presaged in a damage suit recently filed by a Pittsburg (Kan.) boy, through his father, against the Western Coal & Mining Co. The boy says he picked up a pocketful of powder at one of the Western mines, and that later that day, while hunting with some other boys, the powder caught fire in his pocket and he was burned. The father accuses the company of negligence, and asks \$3,000 damages.

utilized in its natural consuming territory, which is the eastern Atlantic and New England states."

Mr. O'Neill then points out the disadvantages of allowing Southern coal to undersell and move across the mines in Ohio to lake ports, move across Illinois to upper Mississippi points and be accorded rates that make it possible to enter the Southwest through the St. Louis gateway.

He then says: "It is thus easily seen that the old established mines in the greatest producing territory in the whole country are slowly but surely being destroyed by competition from Southern fields made possible because Secretary Hoover seeks to permit economic forces a free play for a number of years which an arbitrary factor prevents.

"We are asking our miners to accept a wage scale that is established in West Virginia and Kentucky plus whatever freight differential may exist between those states and Pennsylvania. If this proposal is accepted, the mines of Pennsylvania can continue in operation, and they also will recapture much of the business that has been lost during the past year."

### Wants More Mine Guards In Western Kentucky

Authority to use extra federal guards in the western Kentucky coal mining district to enforce an injunction against striking union miners was requested in a telegram Dec. 20 to Attorney General Stone by L. E. Barnes, chief Deputy United States Marshal at Louisville.

An attempt to dynamite the home of Robert Rolin, superintendent of the Rockport Coal Co., at Centretown, Dec. 19, is believed to be the cause. Details are lacking because of broken telephone or telegraph lines, but it is understood that no members of the Rolin family were injured. Windows were shattered.

A temporary injunction was granted in federal court at Louisville Dec. 18 against thirty-eight union officials, including local union heads in Muhlenberg County, following charges by the Roger Brothers Coal Co., of Bevier, that striking union men intimidated non-union workers on company property.

State officials endeavoring to investigate the dynamiting were handicapped by inability to obtain information from Centretown.

### Decries Quack Remedies for Industrial Ills

That the recent repulse of radicalism by the English-speaking peoples on each side of the Atlantic shows encouraging progress in political sanitation was one of the points made by James A. Emery, counsel for the National Manufacturers' Association, in the course of remarks at a luncheon in Washington, Dec. 17, at which the Smokeless Coal Operators' Association was host. The radical movement in the United States was compared with the quack in the vending of his wares on the street corner, where the audience is large but purchasers few. Despite the advertising, pink pills for a pale nation failed to sell.

While Mr. Emery said some producers should talk less about their rights and think more of their obligations, he declared there is less excuse at present for the intervention of government authority in the conduct of such an industry as is coal production than ever before. It is plain, he declared, that the public wants intervention in the territory of business to proceed no further.

The luncheon was a feature of an association meeting, at which officers were elected for the ensuing year. William D. Ord, president of the Empire Coal & Coke Co., of Landgraf, W. Va., was elected president; William C. Atwater, of New York, first vice-president; W. D. Tams, Jr., of Tams, W. Va., second vice-president; G. H. Caperton, treasurer, and E. J. McVann, secretary.

The bylaws of the association were amended to permit of the appointment of an additional member to the board of directors, so as to provide representation for the new Greenbrier Operators Association. E. S. Simpson was selected to represent the association on the board. The Pocahontas Association will be represented on the board during the coming year by T. S. Farrell and L. Rodman Page, Jr.; the New River Association by G. H. Caperton and Holly Stover; the Winding Gulf Association by W. Gaston Caperton and P. M. Snyder. The directors for the Tug River Association could not be designated until after the meeting of that organization.

The membership committee for the next year will consist of E. White, W. C. Atwater and M. L. Carbey. The transportation committee is to consist of T. S. Farrell, Oscar M. Deyerle and S. C. Higgins.

Coal to the extent of 271,186 tons was used in connection with the manufacture of dyestuffs and tanning materials during 1923, according to the Bureau of the Census. Similar figures covering other industries are as follows: Flags and banners, 1,422 tons; wood, turned and carved, 25,434 tons; cotton-lace goods 66,569 tons; asbestos products, not including textiles, 53,801 tons; sponging and refinishing of cloth, 1,962 tons; paints and varnishes, 83,962 tons; wooden packing boxes, 52,678 tons; paving materials, 542,409 tons; photographic apparatus and materials, 170,417 tons.



## Greater Activity by Labor in Politics Presaged by Death of Gompers

Powers of Leadership, Keen Intelligence and War Work Soften Critical  
Shafts Against Dead Leader—Policy Vindicated by  
Result of Recent Election

BY PAUL WOOTON  
Washington Correspondent of *Coal Age*

The death of Samuel Gompers has peculiar significance to those engaged in coal mining, an industry in which the matter of labor relations constitutes its most acute problem. It is interesting to see how public opinion usually changes after a man's death. Mr. Gompers has been as bitterly attacked, at one time or another, as were Woodrow Wilson or Henry Cabot Lodge. Judging from the newspaper comment his death, as in the case of Wilson and Lodge, has softened the asperities of criticism.

Samuel Gompers always was recognized by those who opposed him as having great power of leadership, of possessing keen intelligence and a great facility of expression both by word and by pen.

The death of labor's leader calls to mind again that he rendered the country a great service during the war. There was nothing of the pacifist in his makeup. At no time was there any suspicion that he was in any way pro-German. He hated Bolshevism and Bolsheviks, and particularly the parlor variety. The remarkable speed with which the man-power of the country was mobilized was due in no small degree to the hearty support of the plan by the president of the American Federation of Labor.

The death of Gompers had been anticipated for a long time before the actual arrival of the Grim Reaper. It had been the source of much speculation. For many years it had been accepted as a matter of course that Gompers would remain president of the American Federation of Labor as long as he lived. For that reason all of the plans for changes in the Federation's policies have been predicated on the assumption that they would be launched after Gompers' death. Gompers was a thorough-going conservative. He was as thoroughly opposed to social nostrums as were the captains of industry. There has been no more bitter critic of Red Russia.

Not only that, for Mr. Gompers was entirely out of sympathy with those who, like Ramsay MacDonald, would draw labor into partisan politics. His whole philosophy was to build up a collective bargaining power of labor and work for such immediate ends as higher wages, better working conditions and shorter hours through the exercise of that bargaining power.

He had no sympathy for a separate labor party. The intensity of his convictions on that point resulted from his vivid personal experiences in his early days, when he was identified with the unsuccessful Knights of Labor. This organization in the eighties attempted to improve the condition of labor through acquiring political positions. They failed in their political efforts and, having no achievements to show

the rank and file of labor, the organization quickly lost its hold on the workers and fell to pieces.

The American Federation of Labor was a reaction against this overambitious policy. Gompers was convinced that the way to get ahead was to concentrate on such concrete objectives as the eight-hour day, higher wages and workmen's compensation. All proposals to weld labor into a political machine brought forth anathema from Gompers. He urged the unions to judge each candidate according to his attitude toward their immediate objectives. His policy was to help those who befriended those policies and to work against those who opposed them, regardless of party. The success of this policy in obtaining such objectives as higher wages, shorter hours and better working conditions has been so conspicuous that it bids fair to be labor's permanent policy, particularly in view of the débâcle which followed a departure from that policy forced upon Gompers during the last campaign.

### Was Against Partisan Politics

It was impossible for even as dominant a character as Gompers to withstand altogether the tide which had swept labor in Germany, France, Great Britain and other countries into one political party. Temporary advantages which had come to labor in Europe greatly strengthened the case of those who urged the American Federation to adopt a similar course. Gompers finally, against his better judgment, was prevailed upon to allow the majority view to prevail.

Despite the complete failure of labor's effort at the last election and the evidences of weakness in the labor parties abroad which have been revealed since labor decided to go along with Senator LaFollette, it is known that the death of Gompers is to see a determined struggle to change the policy of the American Federation of Labor from that advocated by Gompers to that of establishing a political machine over which labor will have entire control. There is no reason to believe that such an effort will prevail. The reversal of the Gompers policy during the last campaign proves to have been the most effective step that could have been taken to confirm it. It furnished a striking vindication of Gompers' traditional position. Had he deliberately planned to spike the proposed change it could not have been done more effectively.

If such an effort were to be successful conditions certainly favored it last summer. There was widespread discontent among the farmers. For that reason more of them were willing to join with labor in a political effort than ordinarily would be the case. The



F. F. Sharpless

Secretary of the American Institute of Mining and Metallurgical Engineers. Snapped by W. E. E. Koepler on the Birmingham trip of the institute while the doctor was in deep cogitation.

United States with all of its manufacturing presents no such conditions as exist in Great Britain, for instance. Despite industrial growth the small farmer continues to occupy a dominant political position. His interests as a rule are not identical with those of the wage earner. The farmer in the United States, like the farmer of other countries, is a conservative. He is a property owner and he has little sympathy for state socialism or anything that approaches it, because he knows government enterprises must be supported by taxation. Gompers was convinced that there could be no permanent alliance between wage earners and farmers.

Advantage will be taken of the death of Gompers by those who want to change the Federation's policies to launch their efforts. There is certain to be something of a struggle and issues may be confused for a time, but the prospects all are that the policies of Samuel Gompers will thrive even more vigorously now that he is dead.

### Coolidge to Call Conference On Mine Safety

In order to reduce the loss of life in the coal mining industry a national conference will be called early next year by President Coolidge. Steps already have been taken by the U. S. Bureau of Mines to arrange a program for the conference, and invitations will be sent out soon after Governors-elect in the coal states have taken office.

The frequency of coal mine explosions with great losses of life, together with the ordinary hazards of the industry, have led to a conclusion on the part of the President and Interior Department officials that the federal government might properly seek the co-operation of the states in promoting greater safety to coal mine workers.

The Governors of all of the principal coal-producing states are to be asked to send representatives, and, as planned, the gathering will include federal and state authorities and representatives of the management and of the workers in the industry.

## Oklahoma Slowly Breaks Grip of Union And Returns to 1917 Scale

After Summer of Trouble 84 per Cent of Output Now Produced by Union  
Men Paid Basic \$5 a Day — Henryetta Field Alone  
Pays \$7.50 — Operators Quit Association

Eighty-four per cent of coal now being produced in Oklahoma, it is estimated, is being mined by 28 mines under the 1917 wage scale, representing a substantial reduction from the scale of 1924. Henryetta, alone, of the important coal mining districts of the state, is operating under the 1924 scale, which is a heavy handicap in competition with operators of the McAlester and Wilburton fields.

The movement toward lower wages and the open shop really started last April at the time of the scale conference in Kansas City, when members of the Southwestern Interstate Coal Operators' Association and representatives of the United Mine Workers of Kansas, Arkansas, Oklahoma and Missouri signed a three-year contract on a basis of the high post-war scale. At that time operators declared the scale confiscatory, and those of the Henryetta (Okla.), the Kansas, Missouri and Arkansas fields who signed, since have had open fewer mines than in preceding years.

McAlester and Wilburton were not represented generally at the Kansas City conference. There operators at first refused to accede to the demands of the miners for a three-year extension of the high scale. The mines were idle during the summer until July, when the open shop movement became active. Those operators who then began to clean up in readiness for opening moved cautiously. They employed no brass bands to advertise their intentions. Here and there operation was started on a small scale, opposed, naturally, by union officials, but made possible by individual members of the union, who, after several months of idleness, were in need of employment.

### Conditions Favor Resumption

Here a situation peculiar to the district acted to aid operators resuming production. The district employs few itinerant miners. Many of them own their homes. They preferred to remain where they were at a smaller wage than to seek higher wages in other fields. And when, in the late summer, they perceived they were following a lost cause in holding out for a three-year extension of the 1923 scale, many were ready to accept offers of the 1917 scale.

For several weeks there were sporadic but insignificant clashes between those who had returned to work and those others who continued to refuse to work for less than they had received in 1923. These grew more severe and finally culminated in organized attacks on mines in the Wilburton district, most notable of which were the Kali-Inla raids of July 18 and Sept. 7, in which open shop workers were shot from ambush, and the attack on Rock Island No. 12, Oct. 6.

Oklahoma national guardsmen were sent to the aid of county officials.

Localities in which trouble had occurred were under virtual martial law until last month, while those mines whose operation had brought on the trouble continued to work and others were opened. The number of deserters from the hold-out faction steadily increased until organized opposition melted away. Last week production in the Wilburton and McAlester fields averaged between 5,000 and 6,000 tons a day.

The mines are not operating on written contracts. At each there is a verbal agreement between the company and the miners as individuals that the scale shall be that effective in November, 1917; that disputes shall be referred to an arbitrator selected by the mine foreman for the company and a committee of miners, and that other working conditions shall be the same as those in effect through the remainder of the Southwestern district under the 1924 contract.

The day wage scale under which the mines now are operating is on a basis of \$5; under the 1924 Southwestern contract it would be \$7.50. The pick scale is on a basis of \$1.01 a ton; under the 1924 contract it would be \$1.25 a ton. There is a 14c. differential between the pick scale and the electric chain machine scale for those mines using machines, allowing a loading price of 72c. a ton, and a runners' and helpers' rate of 15c. a ton.

### Many Mines Affected

Among the companies that now are working on this basis are the Rock Island, one mine, No. 12, at Harts-horne; Great Western Coal & Mining Co., two mines, Krebs; Oak Ridge Coal & Mining Co., one mine, Red Oak; Hailey-Ola Coal Co., three mines, Hailey; Milly-Dow Coal Co., one mine, Dow; Pete Pierce Coal Co., one mine, Carbon; Kali-Inla Coal & Mining Co., one mine, Cambria; McAlester-Edwards Coal Co., three mines, which have been operating open shop three years near Pittsburg, Okla.; the Osage Coal & Mining Co., two mines near Harts-horne; Deegnan & McConnell, three mines at Wilburton; two mines at Coal Gate, and five small slope mines near Lutie, about two miles from Wilburton.

This makes a total of 25 mines using the 1917 scale and the number increases with the market. There are about 60 shipping mines in these fields. All those operating under the new arrangement have withdrawn from the operators' association which signed the Jacksonville agreement.

### Miners Want Tax Repealed

Repeal of the anthracite tax will be sought at the coming session of the Pennsylvania Legislature by the anthracite miners, it has been learned at the office of Thomas Kennedy, president of District No. 7, at Hazleton.

## Expect Anthracite Strike to End This Week

Scranton, Pa., Dec. 22.—Officials of District 1, United Mine Workers, expect a break in the strike of 12,000 Pennsylvania and Hillside Coal & Iron Co. mine workers this week.

Rinaldi Cappellini, district president, announced yesterday that he would attend a special meeting of the Underwood Colliery strikers in Olyphant today and take a vote of the men on a proposition to end the strike immediately and allow him to handle the Underwood grievances. He declared that he would meet with all of the other locals affected by the general committee's strike order and submit his request for a poll on the ending of the walkout to the membership of the individual locals.

Members of the investigating committee sent here by John L. Lewis, International president, have left for their homes for the holidays.

Twelve thousand employees of the Lehigh Valley Coal Co. who planned to take a vote this week on the question of joining in a sympathy strike with the 12,000 employees of the Pennsylvania Coal Co., who have been idle three weeks, were warned by district union leaders that any such action would be recognized as a violation of union laws and would be dealt with accordingly.

The District Executive Board in special session at Scranton sent telegrams to the twelve local unions of the Lehigh Valley Coal Co. advising them to live up to their contracts and not to vote for a strike.

## Court Allows Trial by Jury In Labor Disputes

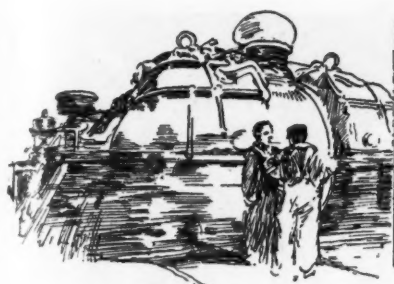
The U. S. District Court for the Western Kentucky division, at Louisville, was reversed Dec. 11 regarding right of jury trial for defendants in labor disputes by the U. S. Circuit Court of Appeals at Cincinnati, which based its judgment on a recent decision of the U. S. Supreme Court. The lower court fined S. C. Nandefor and Letcher Martin, leaders of employees of the Canoe Creek Coal Co. for contempt of court in violating an injunction order restraining employees and United Mine Workers from interfering with the operations of the company in any way.

The men demanded trial by jury, which was refused by the lower court in its interpretation of Sec. 22 of the Clayton Act. The Circuit Court of Appeals, on the previous decision of the Supreme Court, held that this section was no bar to the rights of the men to trial by jury.

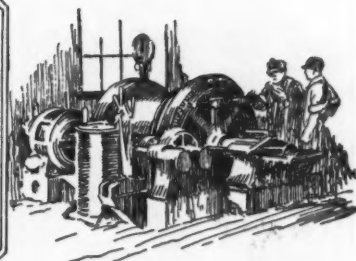
## S. D. Warriner Off Mine Board

Samuel D. Warriner, of Philadelphia, president of the Lehigh Coal & Navigation Co., announced his resignation as a member of the Anthracite Conciliation Board at a meeting Dec. 20 at Hazleton, Pa., of operators whose mines are in District No. 7 of the United Mine Workers. Mr. Warriner said that his resignation was due to pressure of other business. His brother, J. B. Warriner, general manager of the Lehigh Coal & Navigation Co., was elected to succeed him.





## Practical Pointers For Electrical And Mechanical Men



### Slope Switch Controlled By Operator Stationed in Hoist House

Wire Rope Connects Spring-Operated Switch with Hoist—Device Saves Time and Reduces Labor

At the Big Four mine of the Pond Creek-Pocahontas Co., Big Four, W. Va., a simple arrangement for throwing a switch from a distant point was recently applied. This device reduces labor and eliminates delay.

In the background of Fig 1, is the hoist house in which has been installed a new 300-hp. electric hoist. The straight track leading away from the building goes directly down the mine slope which is served by the hoist. Seven-car trips are pulled up through the spring-operated open switch shown in the foreground and are then allowed to run by gravity back on the turnout from this switch and on to the tippie.

The empty-car track is seen on the left of the illustration. From this point the trip of empties is pulled onto the main track and then lowered down the slope. This makes it necessary temporarily to close the switch—shown in the immediate foreground—against the force of the holding spring. Formerly this was done by hand in the ordinary way but now it is performed by the hoist operator, a wire rope being connected to the switch and leading into the hoist house. The rope can be seen lying along the ends of the ties.

The operating lever to which the rope is attached is shown in Fig. 2. This

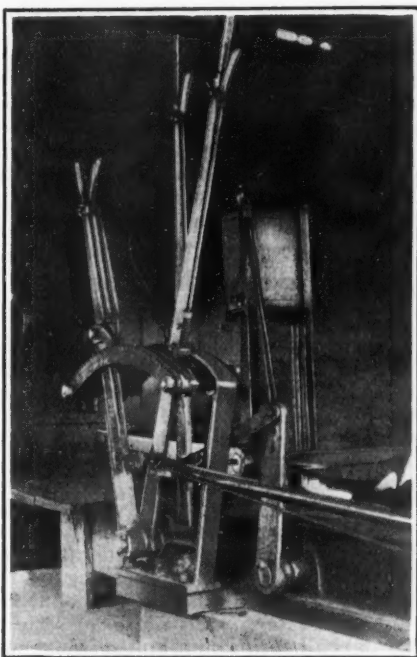


Fig. 2—Switch-Operating Lever

The short outside lever on this electric hoist is connected by a wire rope to a track switch located at the top of the mine slope.

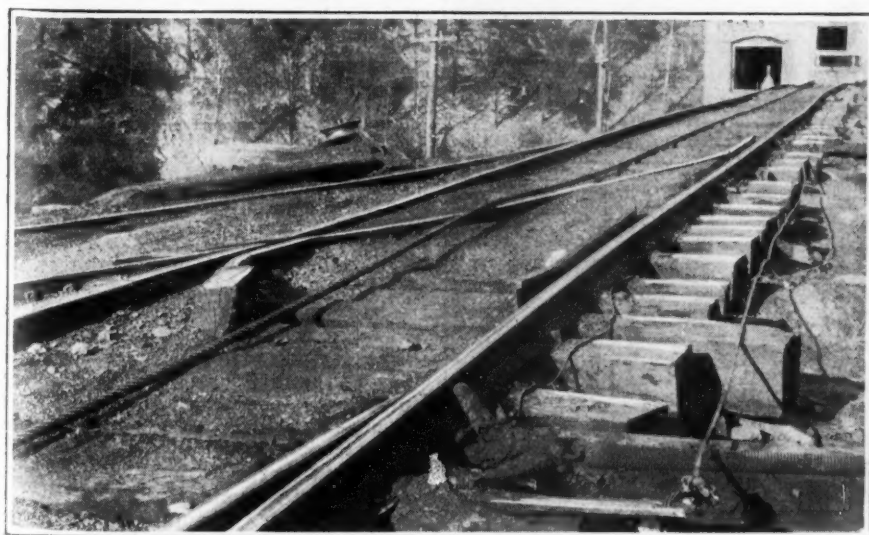


Fig. 1—Track Switch Operated from Hoist House

When a trip of empties is to be let down the slope, the switch in the immediate foreground is closed by the hoist operator. This is accomplished by pulling on the small wire rope. When the tension on the rope is released the coil spring returns the switch to its normal position.

short lever has been added alongside the regular clutch and brake levers. The lever and quadrant were removed from an old steam hoist. It so happened that few changes were necessary to adapt them to the electrical unit. With the present arrangement when empty trips are to be let down the slope there are no delays nor misunderstandings. The control of the switch is, as it should be, entirely in the hands of the hoist operator.

### Test Device and Transformer Safe and Portable

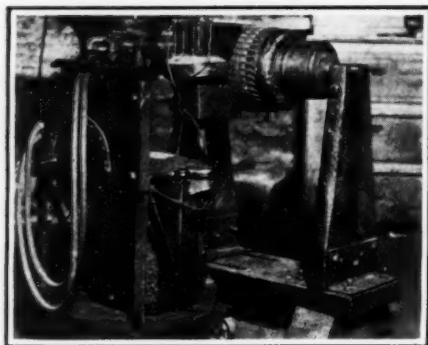
When making high-voltage tests on armatures and other parts of electrical equipment repaired in the mine shop, certain precautions must be taken when handling the high-voltage cables leading from the source of the voltage to the equipment being tested. This problem is simplified by using a portable transformer, in which case the high-voltage test leads can be made short. When short cables are used they may be heavily insulated, thereby greatly reducing any chance of accident.

Another advantage of having the high-voltage transformer portable is that when so arranged it can be moved to a position close to the work. This brings the transformer tap switch within convenient reach of the operator, making it easy for him to adjust the voltage as desired. The fact that this switch and the entire high-voltage apparatus are in sight, and reach, of the operator adds to his safety and no doubt to his ease of mind.

The illustration shows a portable testing transformer used in the central repair shop of the Hillman Coal and Coke Co., at Brownsville, Pa. Mounted on the same platform with the transformer is an armature-testing device. The height of the magnets is adjusted to various armatures by simply raising or lowering them by hand and inserting a large spike into the proper hole of the telescoping standard. This support is made from two sizes of common pipe one inside the other. The platform carrying the transformer and testing magnets is mounted on three, easy-running, casters.

On the outside of the transformer are three primary leads which, by proper connection to the 220-volt supply line, afford three voltages for each position of the dial switch. The range of voltage is as follows:—for point 1—200, 280 and 450 volts; for point 2—450, 500 and 775 volts; for point 3—550, 750 and 1,375 volts; for point 4—800, 1,100 and 1,650 volts; and for point 5—850, 1,875 and 2,400 volts.

The positions of the switch for obtain-



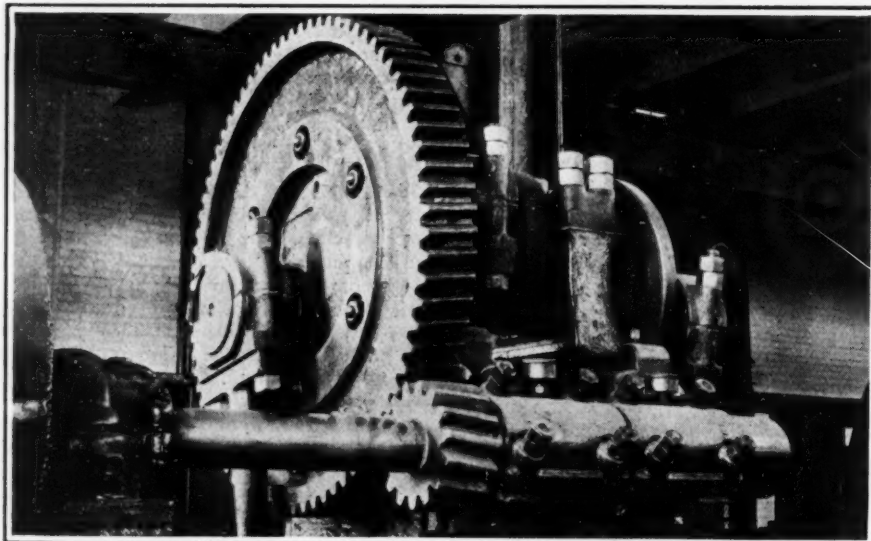
#### Armatures May Be Tested Safely With This Outfit

The testing device and transformer are mounted together, on three casters. The high-voltage testing leads, insulated with rubber hose, are hanging over the top of the board on which the dial switch is mounted.

ing these voltages are marked on the board beside the dial. High-voltage cable covered by heavy rubber hose is used for test leads. Thomas Booker, foreman of the Brownsville shop, explained that the armature testing equipment has no electrical connection with the transformer. Portable leads from the 220-volt supply line are connected to the magnet when they are used for testing an armature. This outfit, including the magnets was made at the Brownsville shop. The transformer was made up from an ordinary unit which had burned out in service.

#### Found That One Set of Gears Was Better Than Two

Helical gears are now being used on many classes of mine equipment. The double-helical, or herringbone gear has been applied to hoisting equipment for many years, and today it is not uncommon to see helical gears in use on mine locomotives. It is claimed that the helical gear is stronger, operates more smoothly and makes less noise than the plain spur gear. Herringbone gears are considered better than plain helical gears because they neutralize thrusts.



#### Tooth Breakage Eliminated by Use of One Gear Set of Helical Type

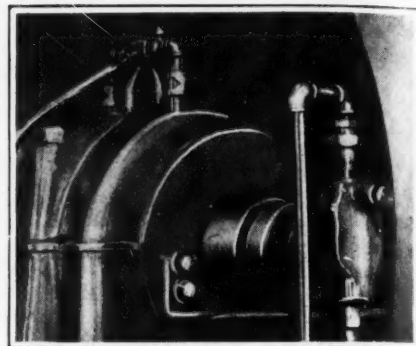
Originally this pump had a large, plain spur gear on each of the two outside crank disks, and a pinion on the countershaft. An investigation of gear breakage disclosed that due to imperfect machining or assembling one pair usually did all the work. Consequently, one gear and its pinion were dispensed with and the others replaced by the helical type which, due to the tooth design, has greater strength.

The Pittsburgh Coal Co. has improved its vertical triplex mine pumps by taking advantage of the greater strength of helical gearing. As originally built these pumps had a large spur gear bolted to each outside crank disk. These gears were driven from a countershaft to which were keyed two pinions. The duty on these pumps is rather severe and as a result there were many cases of broken gearing.

Before making this change, A. B. Kiser, electrical engineer for the coal company, made an investigation which proved that usually one gear transmitted all the load, because it is exceedingly difficult to set two pinions on the countershaft so accurately that the teeth of both will bear with equal pressure on their mating gears. Even if the pinions were set on the shaft exactly right, the slightest movement or slippage of either would throw all the load on the other. It was therefore apparent that one gear and pinion set should be dispensed with and the other be replaced by heat-treated gears of the helical type. One of the pumps on which this change had just been made is shown as it appeared when in the company's central shop at Library, Pa. The gear guard was removed so that a photograph might be taken.

#### Improves Lubrication of Motor-Generator Set

When a bearing on a large machine fails it is usually a serious matter. The 700-hp., flywheel, motor-generator set which supplies the 1,100-hp. direct-current motor of the main hoist at mine No. 251, known as Coalwood Shaft, of the Consolidation Coal Co., Coalwood, W. Va., was originally lubricated by ring-oiled bearings. There are five bearings on this motor-generator set, including the one small bearing on the outside end of the direct-connected 40-kw. exciter. A failure of one of the large bearings prompted Alexander Harley, superintendent of the power and mining department of this division, to devise an auxiliary system.



#### Oil Pump Improves Lubricating System of Large Machine

Sight-feed fittings and petcocks for regulating the flow can be seen above the bearing. In the upper right-hand corner of the room is the 40-gal. gravity feed tank.

The new equipment consists of a gravity-feed system by which two small streams of oil flow continually on top of the shaft at each bearing. The overflow from the oil-cellars runs by gravity to a 10-gal. tank which is located in the flywheel pit just below the floor level. From that point the oil is pumped to a 40-gal. tank set on a platform about 6 ft. above the bearings.

It is interesting to note how the gear-type pump is driven from the shaft of the motor-generator set. The pump is mounted on a forged iron bracket attached to the lower half of the outside bearing of the 700-hp. induction motor. The pump pulley—which is not used as a pulley but instead as a coupling—is set parallel to, and within about  $\frac{1}{4}$  in. of the end of the shaft and is driven by three small studs which are screwed into holes tapped in the end of the shaft. These studs extend and fit loosely into holes drilled in the web of the small solid-spoked pulley.

The original ring-oiling system of the motor-generator set was in no way disturbed by the application of the additional equipment. Therefore, if for any reason, such as insufficient oil or pipe stoppage, the new system should fail, the machine will still receive lubrication from the oil cellars which are always kept full of oil. No bearing trouble has been experienced since the pump and gravity method of lubrication has been added.

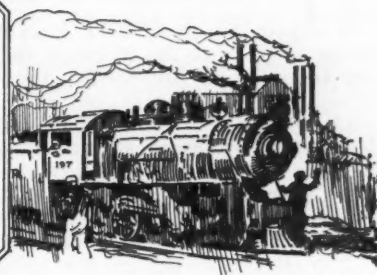
#### Insulation Resistance Depends On Design of Coil Slots

When measuring the insulation resistance of a motor winding it is important to remember that insulation resistance is directly proportional to the thickness of the insulation and inversely proportional to the area. In view of the fact that different manufacturers use different materials and different thicknesses of insulating materials, it is possible to find quite wide variations between motors and generators of the same voltage and power ratings. This accounts for the fact that one manufacturer may turn out a motor with 5 megohms resistance while another manufacturer makes a motor of the same characteristics which measures 25 megohms.





## Production And the Market



### Coal Markets Mark Time Save for Fitful spurts And Halts With Weather Changes

With the end of the year in sight the usual pre-inventory attitude of hesitancy pervades the coal market—no one, apparently, desires to place any orders that can possibly be deferred until next month. This disposition to hold off has created a condition of over-supply with all the attendant evils of no bills, distress coal and a softening tendency in prices. The weather, of course, is an important factor, and this at last seems in a fair way to come, at least temporarily, to the rescue of the harassed coal man after an almost unprecedented stretch of mild temperature.

One of the most interesting developments of the season in the bituminous coal industry was the announcement last week of a 25 per cent increase in wages by independent operators in the Connellsville region of Pennsylvania, bringing the scale to the peak level of 1920. Special significance attaches to the action of these producers in view of the effect it will have on the miners in adjacent regions who will be less likely now than ever to ask for an abrogation of the Jacksonville agreement, and a lower wage such as will enable the mines to resume active operation. Orders for the blowing in of nearly 2,500 ovens by the Connellsville plants have been given, which would seem to substantiate in striking fashion the reports of steady improvement in the iron and steel trade. The note of confidence in the industrial prospect gains steadily in strength, Judge Gary having joined the prophets of prosperity just ahead.

#### Demand for Hard Coal Lacks Strength

Trade in anthracite on the whole lacks strength, demand being such that supplies are more than sufficient to take care of requirements. Lower temperatures and curtailment of output by labor difficulties have been steadying influences on independent prices, but even they

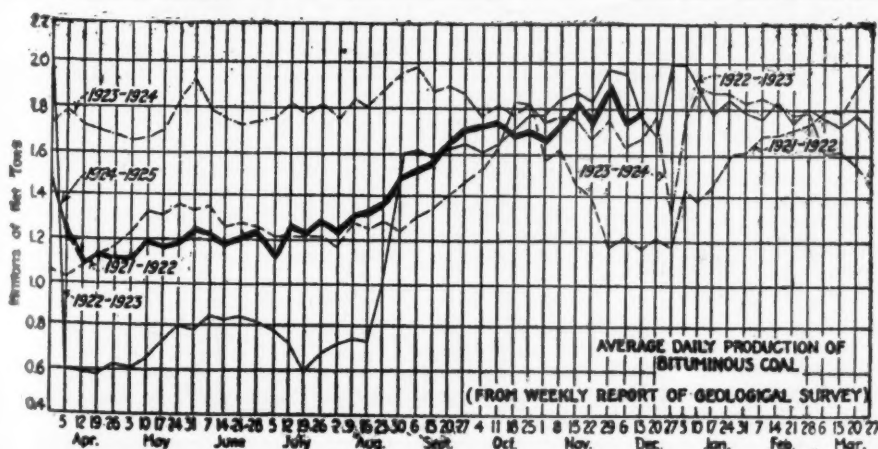
could not prevent a slight sag in quotations from last week. Chestnut has forged ahead of stove in popular demand, the keenness of the call for the latter being less noticeable, due in part to the breaking down of egg by some producers. Pea continues sluggish and steam sizes move slowly. With the double purpose of taking care of the demand for chestnut and moving pea coal one of the large companies has introduced what it calls "special chestnut," a mixture of two-thirds chestnut and one-third pea, quoted at \$8.30 per gross ton f.o.b. mine.

Coal Age Index of spot prices of bituminous coal advanced one point during the last week, standing on Dec. 22 at 170, the corresponding price for which is \$2.06, compared with 169 and \$2.04 respectively on Dec. 15.

#### Recession in Activity at Hampton Roads

A marked reaction in activity was in evidence at Hampton Roads during the week ended Dec. 18, when dumpings of coal for all accounts totaled 400,188 net tons, compared with 479,099 tons in the preceding week.

Production of bituminous coal registered a further advance during the week ended Dec. 13, when, according to the Geological Survey, the output was 10,723,000 net tons. This was an increase of 111,000 tons, revised figures show, over the previous week's total, and that despite the fact that production was curtailed somewhat in the Central Western States by the miners' election day on Dec. 9. This was the fifth successive week in which production was higher than that for the corresponding week of 1923. Anthracite output during the week ended Dec. 13 was 1,772,000 net tons, compared with 1,814,000 tons in the previous week and 1,947,000 tons in the corresponding week of last year.



#### Estimates of Production

(Net Tons)			
BITUMINOUS			
	1923	1924	
Nov. 29.....	8,943,000	9,640,000	
Dec. 6.....	9,829,000	10,612,000	
Dec. 13 (b).....	9,936,000	10,723,000	
Daily average.....	1,656,000	1,787,000	
Cal. yr. to date (c).....	524,136,000	444,520,000	
Daily av. to date.....	1,788,000	1,515,000	
ANTHRACITE			
Nov. 29.....	1,691,000	1,611,000	
Dec. 6.....	1,837,000	1,874,000	
Dec. 13.....	1,947,000	1,772,000	
Cal. yr. to date.....	89,899,000	86,424,000	
COKE			
Dec. 6 (a).....	265,000	174,000	
Dec. 13 (b).....	240,000	192,000	
Cal. yr. to date (c).....	17,391,000	9,134,000	

(a) Revised since last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

### Midwest Is Full of Coal

A severe swoop of cold, running the mercury down far below zero, froze the Midwest region last week. It caught the territory so full of coal that there was no immediate effect upon the market, but even had there been a sudden wild demand for coal it could not have been met at once because of handicapped rail transportation, broken wires and the streets so glazed with ice that retailers' deliveries were slowed down. The cold gave indication of continuing as the days passed, and the first of this week was scheduled to mark a considerable stiffening of domestic markets.

The situation before the cold spell arrived was this: Eastern non-union mines, unable to place their output elsewhere, had dumped low-price coal throughout the Midwest, especially in and around Chicago. A great deal of coal had been shipped on consignment. Illinois and Indiana mine tracks were groaning under "no bills" of lump and egg. Screenings were short and the price was steadily rising, so that southern Illinois best fine coal had touched \$1.90 following a rise to \$1.75@1.80 on the part of central Illinois stuff, which is near the Chicago steam market. Indiana Fourth and Fifth Vein screenings also were passing \$1.75 on their way up.

Domestic prices were sagging badly. Southern Illinois lump was dragging badly at \$3.25 though the circular ran up to \$3.50; central Illinois was in trouble at \$3 and good eastern Kentucky lump was very difficult to move at \$2.25@

\$2.50. Then came the cold. The effect was to stiffen prices, but the permanency of this stiffening depends largely upon the length of the cold spell.

Railroad tonnage from southern Illinois is fairly good considering, although the Illinois Central has shut off for the rest of the year. Mines work from one to four days a week, depending on railroad and other contracts. Cars are plentiful. In the Duquoin field there is little change since last week and conditions are somewhat similar to those in the Carterville district, may be a little worse. Strip mines through all of these districts are getting in good working time on account of the pleasant weather prevailing up to now and are moving their coal at a price.

In the Mt. Olive field there is a little activity on coal going to the Northwest and contracts take up the steam sizes. Mines there are getting one and two days a week with some railroad business. There are no changes in prices. In the Standard field there is gloom. The operators are still selling coal below cost and the miners are not making enough to live on. Screenings are strong at \$1.25 with a tendency to come down with the colder weather.

With St. Louis dealers' yards loaded waiting for cold weather there was a surplus of all kinds of coal on hand and in transit. Domestic was almost at a standstill though it picked up a little with the cold. Country domestic also has been quiet but is a little more active than local. There is a tendency to buy middle grade coals rather than high grade, with very little demand for Standard.

### Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	Dec. 24 1923	Dec. 8 1924	Dec. 15 1924	Dec. 22 1924†
Smokeless lump.....	Columbus....	\$3.35	\$4.10	\$4.10	\$3.75@ \$4.00
Smokeless mine run.....	Columbus....	1.85	2.00	2.00	1.75@ 2.10
Smokeless screenings.....	Columbus....	1.25	1.25	1.25	1.00@ 1.25
Smokeless lump.....	Chicago....	3.50	3.85	3.85	3.60@ 4.00
Smokeless mine run.....	Chicago....	2.10	1.85	1.85	1.75@ 2.00
Smokeless lump.....	Cincinnati....	3.10	3.85	3.75	3.50@ 4.00
Smokeless mine run.....	Cincinnati....	2.00	1.85	1.85	1.75@ 2.00
Smokeless screenings.....	Cincinnati....	1.75	.95	1.15	1.15@ 1.25
*Smokeless mine run.....	Boston....	4.45	4.10	4.10	4.00@ 4.25
Clearfield mine run.....	Boston....	1.80	2.00	1.95	1.65@ 2.40
Cambria mine run.....	Boston....	2.35	2.30	2.30	2.00@ 2.75
Somerset mine run.....	Boston....	2.10	2.15	2.15	1.80@ 2.50
Pool 1 (Navy Standard).....	New York....	3.00	2.80	2.80	2.65@ 2.95
Pool 1 (Navy Standard).....	Philadelphia....	2.95	2.70	2.70	2.50@ 2.90
Pool 1 (Navy Standard).....	Baltimore....	2.30	2.30	2.30	2.10@ 2.50
Pool 9 (Super. Low Vol.).....	New York....	2.25	2.05	2.05	1.90@ 2.25
Pool 9 (Super. Low Vol.).....	Philadelphia....	2.35	2.15	2.15	1.95@ 2.35
Pool 9 (Super. Low Vol.).....	Baltimore....	2.00	1.70	1.70	1.65@ 1.80
Pool 10 (H.Gr. Low Vol.).....	New York....	1.95	1.80	1.80	1.65@ 2.00
Pool 10 (H.Gr. Low Vol.).....	Philadelphia....	1.85	1.75	1.75	1.65@ 1.90
Pool 10 (H.Gr. Low Vol.).....	Baltimore....	1.90	1.55	1.55	1.50@ 1.65
Pool 11 (Low Vol.).....	New York....	1.60	1.60	1.60	1.50@ 1.75
Pool 11 (Low Vol.).....	Philadelphia....	1.65	1.45	1.45	1.35@ 1.60
Pool 11 (Low Vol.).....	Baltimore....	1.75	1.45	1.45	1.40@ 1.50

#### High-Volatile, Eastern

Pool 54-64 (Gas and St.).....	New York....	1.60	1.50	1.50	1.40@ 1.60
Pool 54-64 (Gas and St.).....	Philadelphia....	1.70	1.50	1.50	1.40@ 1.60
Pool 54-64 (Gas and St.).....	Baltimore....	1.50	1.45	1.45	1.40@ 1.50
Pittsburgh ac'd gas.....	Pittsburgh....	2.40	2.40	2.40	2.30@ 2.50
Pittsburgh gas mine run.....	Pittsburgh....	2.25	2.10	2.10	2.00@ 2.25
Pittsburgh mine run (St.).....	Pittsburgh....	2.00	1.85	1.85	1.75@ 2.00
Pittsburgh slack (Gas).....	Pittsburgh....	1.65	1.20	1.20	1.25@ 1.35
Kanawha lump.....	Columbus....	2.60	2.30	2.30	2.10@ 2.50
Kanawha mine run.....	Columbus....	1.60	1.55	1.55	1.45@ 1.65
Kanawha screenings.....	Columbus....	1.05	.90	.90	.85@ 1.05
W. Va. lump.....	Cincinnati....	2.55	2.60	2.20	1.85@ 2.60
W. Va. gas mine run.....	Cincinnati....	1.45	1.45	1.50	1.35@ 1.65
W. Va. steam mine run.....	Cincinnati....	1.45	1.45	1.40	1.30@ 1.50
W. Va. screenings.....	Cincinnati....	1.20	1.00	.95	.85@ 1.00
Hooking lump.....	Columbus....	2.60	2.55	2.55	2.35@ 2.65
Hooking mine run.....	Columbus....	1.75	1.60	1.60	1.50@ 1.75
Hooking screenings.....	Columbus....	1.30	.80	.80	1.05@ 1.15
Pitts. No. 8 lump.....	Cleveland....	2.45	2.45	2.40	2.00@ 2.85
Pitts. No. 8 mine run.....	Cleveland....	1.90	1.85	1.85	1.85@ 1.90
Pitts. No. 8 screenings.....	Cleveland....	1.50	1.20	1.35	1.40@ 1.60

Midwest	Market Quoted	Dec. 24 1923	Dec. 8 1924	Dec. 15 1924	Dec. 22 1924†
Franklin, Ill. lump.....	Chicago....	\$3.50	\$3.35	\$3.25	\$3.00@ \$3.50
Franklin, Ill. mine run.....	Chicago....	2.35	2.35	2.35	2.25@ 2.50
Franklin, Ill. screenings.....	Chicago....	1.95	1.50	1.60	1.65@ 1.90
Central, Ill. lump.....	Chicago....	3.00	2.85	2.85	2.75@ 3.00
Central, Ill. mine run.....	Chicago....	2.10	2.20	2.20	2.15@ 2.25
Central, Ill. screenings.....	Chicago....	1.35	1.35	1.65	1.65@ 1.85
Ind. 4th Vein lump.....	Chicago....	3.25	3.10	3.10	3.00@ 3.25
Ind. 4th Vein mine run.....	Chicago....	2.60	2.35	2.35	2.25@ 2.50
Ind. 4th Vein screenings.....	Chicago....	1.70	1.55	1.55	1.60@ 1.80
Ind. 5th Vein lump.....	Chicago....	2.50	2.75	2.75	2.50@ 3.00
Ind. 5th Vein mine run.....	Chicago....	2.10	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings.....	Chicago....	1.55	1.30	1.30	1.50@ 1.65
Mt. Olive lump.....	St. Louis....	3.10	3.00	3.00	3.00
Mt. Olive mine run.....	St. Louis....	2.50	2.35	2.35	2.25@ 2.50
Mt. Olive screenings.....	St. Louis....	1.75	1.10	1.10	1.00@ 1.25
Standard lump.....	St. Louis....	2.85	2.75	2.75	2.75
Standard mine run.....	St. Louis....	1.95	1.95	1.95	1.90@ 2.00
Standard screenings.....	St. Louis....	1.35	1.05	1.05	1.00@ 1.15
West Ky. lump.....	Louisville....	3.00	2.60	2.35	2.00@ 2.40
West Ky. mine run.....	Louisville....	1.60	1.60	1.55	1.35@ 1.75
West Ky. screenings.....	Louisville....	1.30	1.10	1.10	1.00@ 1.15
West Ky. lump.....	Chicago....	2.85	2.60	2.35	2.25@ 2.50
West Ky. mine run.....	Chicago....	1.75	1.55	1.55	1.40@ 1.65

#### South and Southwest

Big Seam lump.....	Birmingham..	3.85	3.10	2.85	2.50@ 3.25
Big Seam mine run.....	Birmingham..	1.95	1.70	1.60	1.50@ 1.90
Big Seam (washed).....	Birmingham..	2.35	1.85	1.85	1.75@ 2.00
S. E. Ky. lump.....	Chicago....	3.10	2.75	2.60	2.40@ 2.80
S. E. Ky. mine run.....	Chicago....	1.85	1.60	1.50	1.40@ 1.50
S. E. Ky. lump.....	Louisville....	3.00	2.85	2.60	2.50@ 2.75
S. E. Ky. mine run.....	Louisville....	1.60	1.60	1.40	1.35@ 1.50
S. E. Ky. screenings.....	Louisville....	1.20	.95	.95	.85@ 1.10
S. E. Ky. lump.....	Cincinnati....	2.85	2.85	2.35	2.00@ 2.75
S. E. Ky. mine run.....	Cincinnati....	1.55	1.55	1.50	1.25@ 1.65
S. E. Ky. screenings.....	Cincinnati....	1.00	.95	.90	.75@ 1.10
Kansas lump.....	Kansas City..	4.75	4.75	4.75	4.50@ 5.00
Kansas mine run.....	Kansas City..	3.25	3.10	3.00	2.75@ 3.25
Kansas screenings.....	Kansas City..	2.00	2.30	2.30	2.25@ 2.35

\* Gross tons, f.o.b. vessel, Hampton Roads.

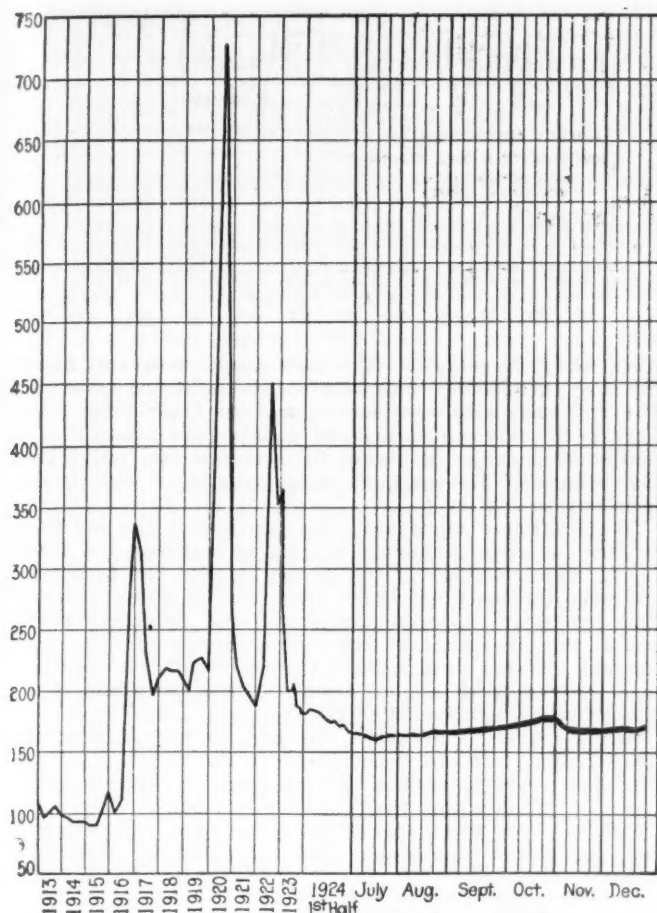
† Advances over previous week shown in heavy type, declines in italics.

### Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Dec. 24, 1923	Dec. 15, 1924	Dec. 22, 1924†
Broken.....	New York....	\$2.34	Independent \$8.50@ \$10.00	Company \$8.00@ \$9.25	Independent \$8.00@ \$9.25
Broken.....	Philadelphia....	2.39			Company \$8.00@ \$9.25
Egg.....	New York....	2.34	9.85@ 10.50	8.75@ 9.25	8.75@ 9.25
Egg.....	Philadelphia....	2.39	9.85@ 12.20	8.75@ 9.25	8.80@ 9.25
Egg.....	Chicago....	5.06	9.60@ 11.50	8.00@ 8.35	8.17@ 8.40
Stove.....	New York....	2.34	9.85@ 11.00	8.75@ 9.25	9.00@ 9.50
Stove.....	Philadelphia....	2.39	9.85@ 12.20	8.90@ 9.25	9.15@ 9.50
Stove.....	Chicago....	5.06	9.60@ 12.50	8.00@ 8.35	8.80@ 9.00
Chestnut.....	New York....	2.34	9.85@ 11.00	8.75@ 9.25	8.75@ 9.40
Chestnut.....	Philadelphia....	2.39	9.85@ 12.20	8.90@ 9.25	9.25@ 9.40
Chestnut.....	Chicago....	5.06	9.60@ 12.50	8.00@ 8.35	8.40@ 8.41
Pea.....	New York....	2.22	6.00@ 6.50	6.15@ 6.65	6.15@ 6.60
Pea.....	Philadelphia....	2.14	6.35@ 7.50	6.35@ 6.60	6.35@ 6.60
Pea.....	Chicago....	4.79	6.00@ 6.75	5.40@ 6.05	5.36@ 5.75
Buckwheat No. 1.....	New York....	2.22	2.00@ 3.00	3.50	2.00@ 2.50
Buckwheat No. 1.....	Philadelphia....	2.14	2.25@ 3.50	3.60	2.50@ 3.00
Rice.....	New York....	2.22	1.35@ 2.25	2.50	1.75@ 2.00
Rice.....	Philadelphia....	2.14	1.75@ 2.50	2.50	2.00@ 2.25
Barley.....	New York....	2.22	1.00@ 1.50	1.50	1.25@ 1.50
Barley.....	Philadelphia....	2.14	1.00@ 1.50	1.50	1.50
Birdseye.....	New York....	2.22	1.25@ 1.45	1.60	1.40@ 1.60

\* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.





Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1924		1923	
	Dec. 22	Dec. 15	Dec. 8	Dec. 24
Index	170	169	171	178
Weighted average price	\$2.06	\$2.04	\$2.07	\$2.16

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke; 1913-1918," published by the Geological Survey and the War Industries Board.

### Kentucky Was Ready to Shut Down

Summery weather before the cold snap caused a slow market that has resulted in a number of mines closing down until after the holidays, although Kentucky is showing a larger number of operating hours and larger production, with a greater percentage of mines running, probably, than any other state in the Union, figuring on a percentage basis, with the possible exception of West Virginia.

Prices are weak all along the line. It was reported that some West Virginia 4-in. lump had been offered at Louisville at \$1.80 a ton. Some Harlan coal was offered to jobbers at anything they could get for it, the understanding being that it was demurrage coal. West Kentucky 6-in. block is selling at \$2@2.25, with some forced sales reported as low as \$1.60@1.75. Eastern Kentucky block coal is \$2.25@2.50 and as high as \$2.75 asked, with some specialty coals probably selling as high as \$3.25, although \$3 appears to be even above the buying top under existing conditions.

Screenings are selling at 80c.@1.10 for eastern Kentucky, with some stock reported at 75c. Western Kentucky is quoting \$1@1.15 a ton. Mine run in either field is \$1.35@1.60, with some as high as \$1.75. Lump, egg and nut are generally quoted at \$2 and under, small nut as low as \$1.40, with some good egg and lump quoted slightly over \$2.

### Northwest Docks Are Rushed

Two more ships, loaded and cleared from lower lake ports on Dec. 12, the last day of the insurance privileges, closed the navigation season at Duluth last week. These ships were not expected this year, hence the report last week that navigation had closed. One of the boats, the E. L. Ford, has arrived with a cargo of Pocahontas at the

Inland dock, and the other, the Grammer, arrived Tuesday night. Dock men assert that the docks are busier now than they have ever been.

Despite the movement, anthracite is still a drug on the market. There is still some Pocahontas left because of recent shipments to the port, but it is stated authoritatively that this will all be gone by the middle of January. Prices are firm all around.

The bituminous movement to North Dakota and northern Minnesota is very satisfactory, and more than makes up for the loss of a great part of the Twin City trade, which is still being served from Kentucky all-rail. Industries also are coming into the field and some have put out their year's specifications already. A few contracts have been let. It looks as if the stocks on docks, which are said to be the largest in history for this time of the year, will be fairly cleaned up before the opening of navigation.

At the Twin Cities real winter weather, with the thermometer below zero, has contributed support to the coal market. Its full effect will not be seen at once. Yard stock must be used first. But prices are stiffening since the cold is beginning to shut off the flow of surplus Chicago and St. Louis coal. Screenings have been steadily rising in price.

At Milwaukee there is a better demand for coal at the docks, and the movement with some dealers is increasing. Dealers are looking for a heavier call for fuel after the holidays, when consumers are expected to begin filling their bins for the real winter months. Navigation is now closed for the winter. During last week Milwaukee received two cargoes of anthracite, amounting to 16,100 tons, and a 7,600 ton cargo of bituminous coal. These cargoes make Milwaukee's receipts for the season 821,962 tons of anthracite and 2,594,623 tons of bituminous coal.

### Western Market Is Steady

A little cold weather in the last week and the promise of more has had a strengthening effect on the Southwestern market. Householders who laid in small amounts early in the fall are being compelled to replenish. There still is a small surplus of coarser grades at the mines, but this is beginning to move. Screenings are becoming scarce.

The Colorado market has softened somewhat due to the sudden appearance of warm weather. Steam and nut coals are really a drug on the market at the present time. Prices on steam coal are listless.

In Utah increased activity in metal mining and smelting is stimulating the slack and coke markets somewhat. The Utah territory has experienced very cold weather in sections during the past week or two, and dealers' stocks are very low as a rule. Mines are working a little better than 60 per cent, but not much. The coast business is described as fair; in the Northwest as "getting better"; Idaho and Nevada "not so good," and Utah "fair." Prices remain steady and collections are improving.

### Conditions Mixed in Ohio

Colder weather north and west has served to bolster up a flagging market at Cincinnati with little spurts of activity. Overproduction is shown by hundreds of "no bill" cars on track. Distress coal is proving a drug on the hope of holding up the price of domestic, and added to this has been open price cutting by large producers in West Virginia. Run of mine for both steam and gas purposes holds to its established keel, while slack, after taking a dip, has recovered from the decrease in the make by mines that have already closed for the holidays. The smokeless market proceeds on its way as usual.

Buying at Columbus is largely haphazard, with many users depending on demurrage coal for supplies. As a result there is little strength shown, and prices, outside of screenings, have weakened perceptibly. Ohio domestic coals are extremely weak and production has slumped. In rural sections coal is scarcer with dealers and a fair business is booked in certain sections. Michigan and Indiana points are pretty well congested, however. Retail prices have softened and some dealers are making low quotations in the hope of cleaning up. Manufacturing has not picked up much and most of the larger consumers have fair fuel stocks. There is a growing scarcity of screenings and prices have advanced sharply.

Slack is scarce compared with demand in the Cleveland market and spot prices have stiffened. Inquiries for other steam sizes are negligible despite the fact that industrial plants throughout this section have but a few weeks' coal

reserves on hand. The railroads are fairly well stocked and retail yards also are pretty well filled up since the domestic trade has been more or less quiet due to the mild weather.

### Situation Changes Little at Pittsburgh

At Pittsburgh a slight increase in spot demand has failed to relieve the highly competitive condition existing. Some shading of prices is suspected; they certainly are no stronger at any point. A technical exception is slack, steam being quotable at \$1.10@1.20 against \$1.10 flat a week ago, and gas at \$1.25@1.35, an advance of 10c. This is attributed largely to light shipment of lump. Independent operators in the Connellsville region have returned suddenly to the Frick scale, adding 25 to 35c. to the cost of producing a ton of coal. This will be reflected in byproduct coal but is unlikely to have any direct influence upon steam and gas coal prices. The steel industry is operating at 80 per cent, against 66 per cent in October.

Little improvement is observable in the Buffalo coal trade. The consumer is very finicky and he will seldom pay full price for a car he may happen to know is stranded. The big smelting furnaces, however, are running at a better rate than they were and the lake trade is already preparing for better business next season. It was pretty nearly spoiled this season by poor ore and coal activity. Bituminous stocks are considerably smaller than they were a year ago and are running down right along. The consumer is eager for bargains and will seldom buy unless he can get them.

### Interest Lacking in New England

In New England steam buyers are as scarce as hen's teeth, and only those factors who have rehandling facilities of their own are in position to adhere to their asking prices of a fortnight ago. Shippers who have cargoes on hand at railroad wharves are forced to accept new low levels almost from day to day, and profits have gone by the board.

Accumulations are again the rule at the Virginia terminals. The agencies are therefore once again curtailing shipments to tidewater and at the time insisting upon prices that range from \$4 flat to \$4.25 per gross ton, f.o.b. vessel, even though on car figures at this end will net less than \$4 at Hampton Roads. Neither off-shore nor coastwise is there anything to warrant higher f.o.b. levels than now prevail.

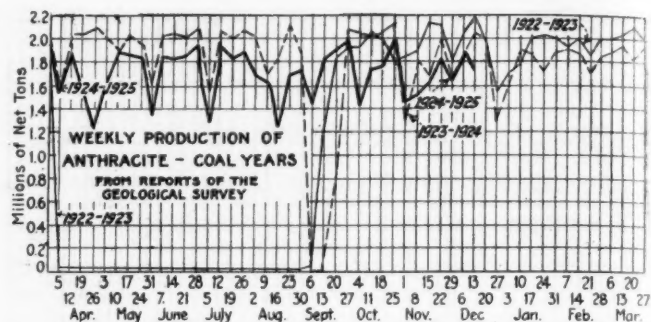
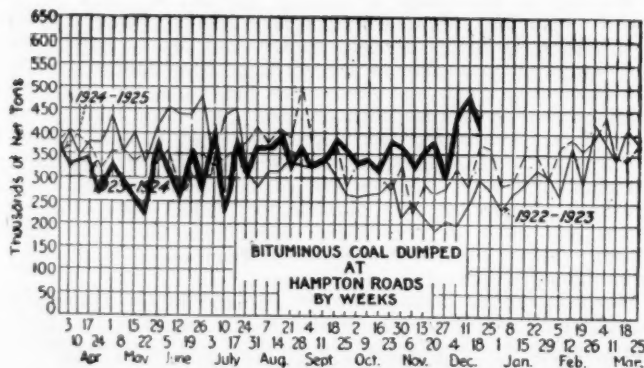
How the trade regards the 1925 outlook is reflected in bids submitted Dec. 15 for New Haven R.R. supply for the coal year 1925-6, as low as \$4.94 having been named alongside Boston for Kanawha coal and \$4.80 for coal from the Fairmont district. Both are coals taking a higher rate to Tidewater than Pocahontas and New River.

All-rail demand is no exception. The tonnage moving is light, and there are few signs of better business ahead.

### Interest Picks Up in Atlantic Markets

Activity at New York was fair during the week. Contract coal moved freely and consumers bought enough to meet current needs, inventory time being blamed for purchases not being heavier. Inquiries on contracts for next year are beginning to arrive and many are about ready to be closed. Railroads are buying good sized tonnages where the prices are right, but there does not seem to be any hurry otherwise. Tidewater coal moved slowly during the week. Receipts are heavy considering conditions, but prices remain steady.

At Philadelphia a little more interest has been shown in the trade recently. The business situation is improving, the trend in textiles continuing the good pace in evidence



since early November. The iron trade, however, shows the most satisfactory improvement, and is buying more coal. The railroads also continue to add to their piles. Gas slack is the only coal that is not equal to the demand. The continued shortage of orders for screened coal holds back the tonnage of fine coal, and prices usually are only quoted from day to day on it.

The Baltimore trade hails the passing of the old year, confident of improvement in respect to both gas and steam fuels. For a number of weeks the demand has been light and even the restricted output in excess of actual demand. This has meant an accumulation at both producing points and at tide, the latter in such cases where coals have been brought through in quantity on other than direct consignment. Increasing export trade to Mediterranean ports has given encouragement to that end of the business.

While there is no active demand in the Birmingham market, some new steam business is being booked, mostly in the open market, with a few contracts being negotiated recently. It is stated that the Mobile Light & Power Co., which has been using fuel oil for some time, will return to coal for power production. General industrial demand is slightly improved.

### Anthracite Trade Lacks Strength

Anthracite demand at New York has been rather weak and there has been more than enough coal to meet requirements. But for reduced output independent coals probably would be begging by this time. As it is quotations for the important coals are lower than last week. Chestnut has displaced stove as the leader in demand in the New York market, but this is partly due to increased peddler and cellar trades. One of the large companies has put on the market what is known as "special chestnut," consisting of a mixture of chestnut and pea. It is quoted at \$8.30 per gross ton f.o.b. mine. The situation with regard to stove has been eased considerably by the breaking down of egg coal by some operators. Pea and the steam sizes move slowly.

The Philadelphia market is not at all strong. Nut continues most in demand but stove is far from being sought after as it was a few weeks ago. There is hardly any demand for egg and all companies are breaking it down to smaller sizes. Steam coals are inclined to be draggy, and there appears to be more than enough to go around.

Domestic consumption at Baltimore has been at a minimum, and as a result dealers, while for the most part cautious not to overstock and tie up their money, are fairly well crowded with supplies and able to handle all possible demands rapidly. Dealers in some cases complain of poor preparation of coal by producers.

Anthracite trade at Buffalo is decidedly slack. The weather has not been cold enough to encourage buying and the prediction of a fierce blizzard in sight, bound this way, does not help matters. The sellers of independent anthracite agree that they are not doing much trade and their prices are not satisfactory. There is so much coke, oil, smokeless coal and natural gas to be had that the anthracite trade is pretty badly cut to pieces.

### Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended Dec. 6, 1924.....	968,256	193,256
Previous week.....	878,631	172,033
Week ended Dec. 8, 1923.....	913,774	173,156
	Surplus Cars	
	All Cars	Coal Cars
Dec. 7, 1924.....	208,451	95,961
Nov. 30, 1924.....	183,914	82,819
Dec. 7, 1923.....	197,128	104,245
Car Shortage		



## Foreign Market And Export News

### British Market Improves in Tone; Price Level Firmer

The Welsh steam coal market has improved in tone and is steadier, though it is not certain whether this is to be taken as a definite all-round improvement or merely the result of overseas buyers seeking to place the balance of this year's requirements and so obtain shipment before the Christmas holidays. For several months buyers have been holding off the Welsh market and have used American and German competition with the view of forcing down Welsh prices. European stocks in consequence have attained a low level, and it is now generally recognized that no further reductions in Welsh prices are forthcoming. Shipments are heavier though still below normal and operators are getting slightly higher prices. No pits have reopened but those that had been working irregularly are now operating more consistently.

The Newcastle market also has im-

proved and inquiry has broadened out, the steam coals collieries having a clear program of work until the Christmas holiday. Gas and coking coals are pretty well booked.

A contract has been placed for 25,000 tons of Durham or Northumberland steams for the Swedish State Railways, shipment to be made from January to April. There are various other smaller contracts, mostly for gas coals, none exceeding about 5,000 tons. It is rumored that an Italian order for 750,000 tons of large coals has been placed at 24s. 6d. to 25s. 6d. f.o.b. Wales. The Dutch Ministry of Marine is asking tenders on 13,000 tons.

Production again advanced slightly, the output of the British collieries in the week ended Dec. 6, a cable to *Coal Age* states, being 5,336,000 tons according to the official reports. This compares with 5,303,000 tons produced in the preceding week.

### No Relief for Dullness in Sight In French Market

Little change is discernible in the French market, house coals being relatively quiet and the industrial coal market dull. Though holidays will help to reduce the output this month, imports from South Wales have been lower this week and French buying of German "free" coal is limited. Canal freight is steady at 25f., Béthune-Paris, and the rolling stock situation is normal.

In the first ten days of December the supply of Ruhr coke totaled 135,125 tons, a daily average of 13,500 tons. Last month's deficiency of supply is being partly covered this month. The price of indemnity coke is unchanged. With the exception of the Aciéries de Longwy, which were not part of the former association, all members of the O.R.C.A. have adopted a new status, which is expected to be signed at an early date.

During the first twenty-nine days of November France and Luxemburg received indemnity deliveries of 202,600 tons of coal, 213,300 tons of coke and 40,900 tons of lignite briquets, a total supply of 456,800 tons and daily average of 15,700 tons.

### Dullness Becomes General at Hampton Roads

Business at Hampton Roads is very dull, due chiefly to unusually warm weather, stopping of lake shipments and the general pre-holiday lull. The market has weakened somewhat, and the outlook for business before Jan. 1 is not bright.

Some foreign movement was recorded, but it was mainly on contracts which were being closed out. Bunker business has been fair, coastwise movement showing a decrease. Inquiries have slumped and large accumulations are piling up at the piers.

Reports from fields serving the port were that practically all coal operations, particularly those in West Virginia and southwest Virginia, would close down Dec. 20 and remain inactive until Jan. 2. Shippers looked forward to the closing of the mines in expectation of that action having a tendency to stimulate the market.

### Export Clearances, Week Ended Dec. 20, 1924

#### FROM HAMPTON ROADS

For Africa:	Tons
Ital. Str. Giovanni, for Dakar.....	9,897
For Brazil:	
Ital. Str. Valnagna, for Rio de Janeiro	6,020
Br. Str. Innerton, for Rio de Janeiro.	6,624
Jap. Str. Holland, Maru for Rio de Janeiro .....	7,022
For Canal Zone:	
Amer. Barge Darien, for Cristobal.	7,224
Amer. Str. Ulysses, for Cristobal....	12,052
For Canada:	
Amer. Schr. B. S. Taylor, for St. Georges .....	1,024
For Cuba:	
Nor. Str. Dagfin, for Havana.....	3,145
Dan. Str. Phonix, for Cienfuegos...	3,010
For Dutch Guiana:	
San. Str. Silkeborg, for Paramaribo.	248
For West Indies:	
Jap. Str. Yone Maru, for Fort de France .....	8,018
Nor. Str. Marge, for Kingston.....	1,219

#### FROM PHILADELPHIA

For Cuba:	
Br. Str. Redbird, for Havana.....	—
Br. Str. Peursum, for Antilla.....	—

#### FROM BALTIMORE

For France:	
Br. Str. Ronda, for Marseilles.....	6,942
For Italy:	
Br. Str. Dunrobin, for Genoa.....	7,250

### Hampton Roads Pier Situation

	Dec. 11	Dec. 18
N. & W. Piers, Lamberts Pt.:		
Cars on hand.....	1,504	1,895
Tons on hand.....	98,697	123,389
Tons dumped for week.....	181,958	131,760
Tonnage waiting.....	10,000	10,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,910	1,970
Tons on hand.....	130,550	132,300
Tons dumped for week.....	115,270	106,554
Tonnage waiting.....	6,474	9,194
C. & O. Piers, Newport News:		
Cars on hand.....	2,053	2,413
Tons on hand.....	92,893	120,450
Tons dumped for week.....	130,539	118,997
Tonnage waiting.....	4,505	21,495

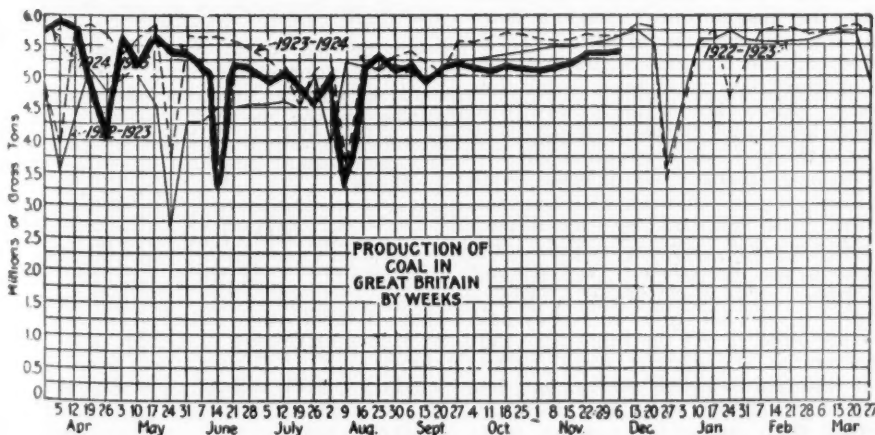
### Pier and Bunker Prices, Gross Tons

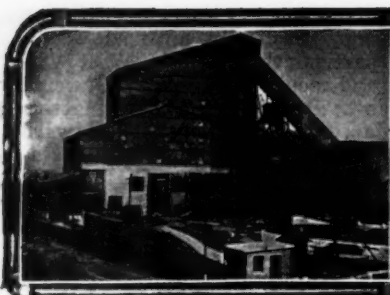
	Dec. 13	Dec. 20
Pool 9, New York....	\$4.75@ \$4.90	\$4.75@ \$5.00
Pool 10, New York....	4.40@ 4.65	4.40@ 4.65
Pool 11, New York....	4.20@ 4.45	4.30@ 4.75
Pool 9, Philadelphia..	4.90@ 5.25	4.90@ 5.25
Pool 10, Philadelphia..	4.45@ 4.70	4.45@ 4.70
Pool 11, Philadelphia..	4.30@ 4.50	4.30@ 4.50
Pool 1, Hamp. Roads.	4.15	4.10
Pool 2, Hamp. Roads.	4.10	3.90
Pools 5-6-7 Hamp. Rds.	4.00	3.95
BUNKERS		
Pool 9, New York....	\$5.00@ \$5.15	\$5.00@ \$5.25
Pool 10, New York....	4.65@ 4.90	4.65@ 4.90
Pool 11, New York....	4.50@ 4.70	4.55@ 4.70
Pool 9, Philadelphia..	4.90@ 5.25	4.90@ 5.25
Pool 10, Philadelphia..	4.75@ 4.95	4.75@ 4.95
Pool 11, Philadelphia..	4.50@ 4.70	4.50@ 4.70
Pool 1, Hamp. Roads.	4.25	4.80
Pool 2, Hamp. Roads.	4.15	4.00
Pools 5-6-7 Hamp. Rds.	4.10	4.10

### Current Quotations British Coal f.o.b. Port, Gross Tons

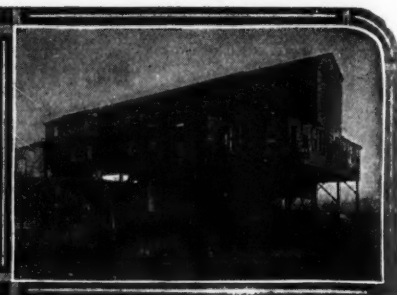
	Dec. 13	Dec. 20†
Cardiff		
Admiralty, large	27s. 6d.	27s. 6d. @ 28s.
Steam smalls....	20s.	16s.
Newcastle:		
Best steams....	18s. 6d. @ 18s. 9d.	18s. 9d. @ 22s. 6d.
Best gas.....	22s. @ 22s. 6d.	21s. 6d. @ 22s. 6d.
Best Bunkers....	17s. 6d. @ 19s.	19s. @ 20s.

† Advances over previous week shown in heavy type declines in italics.





## News Items From Field and Trade



### ALABAMA

According to the annual report just submitted to Governor Brandon by the State Board of Administration, the net earnings of state convicts employed in and around coal mines in Alabama last year were \$621,967.04. State convicts are employed in Flat Top, Belle Ellen, Banner and Aldrich mines, the three former being large operations. The prisoners are worked under the care and supervision of the state.

### IDAHO

The Equitable Coal Co., a Utah corporation, has been denied permission by the Idaho authorities to sell stock in that state. It was held that investors were not sufficiently protected in that an extravagant proportion of the stock is held out for promotion services. It also was held that the security of the company's property, consisting of 1,440 acres of coal land, was not satisfactory. "This application," said the Idaho commissioner, "discloses that the corporation is the holder of a lease of 1,440 acres, a part of which is subject to cancellation at any time by the Secretary of the Interior upon the failure of the lessor to comply with any of five or six conditions."

### ILLINOIS

The 1,400 inhabitants of Glen Carbon, dependent almost entirely on mine No. 2 of the Madison Coal Corporation, are happy. For nine months the mine failed to work a single day. Then without warning a message to resume operations came and on Dec. 15 the big whistle sounded, calling the miners to work. Thirty men were lowered into the shaft to clean up fallen debris and on Dec. 16 the machine runners started actual mining.

Harry Tanner and Charles Law, of Pana, have sold the Litchfield coal mine, at Litchfield, to John Puckett, of that city, for \$60,000. Temple McDonald, of Hillsboro, has been named manager and will reopen the mine.

Reports from the office of C. J. Nelson, general agent of the Chicago, Burlington & Quincy R.R. at Herrin state that October was the largest month in coal traffic this year. In October the road handled 1,150,040 tons of coal in a total of 23,047 cars.

Two new railroads will be constructed, if they are granted permission, in Franklin County, centering around Benton, the county seat. The Herrin-Benton Ry., which would operate from Herrin to Benton, and the Benton Northwestern Ry., which would operate

from Benton to McLeansboro, have both filed petitions with the Illinois Commerce Commission. They both will be operated by steam and the former will carry all classes of passengers, freight, etc., while the latter will handle freight traffic only.

William Cowell, mine manager of Bell & Zoller mine No. 2 at Zeigler, has resigned effective at once to accept a similar position with the Chicago, Wilmington & Franklin Coal Co.'s Orient No. 2 mine, at West Frankfort. Henry Taak, of Centralia, has been appointed to fill his vacancy in Zeigler.

The Gulf Mine at Sparta failed to pay off its regular bi-weekly payroll Nov. 30 and as a result the property is idle. According to reports the company was able to pay only about 25 per cent to the 250 men employed.

### INDIANA

Cairy Littlejohn, state mine inspector for Indiana, is in a serious condition at the Methodist Hospital, Indianapolis, following an operation for intestinal trouble nine days ago. His condition has become serious during the past few days.

Initiation fees in District No. 8, United Mine Workers, comprising virtually all the block coal field of Indiana, will be \$20 instead of \$10 after Jan. 1. This was decided at the recent convention held in Brazil. A rule also was passed by which persons who go to work in non-union mines or shops and afterward want to regain their membership in the union shall pay, in addition to the regular initiation fee, a fine of \$50, the fine to go to the local union.

### KANSAS

A class in mining has been organized at Arma with seventeen members, under the instruction of Obadiah Dray and the supervision of Prof. J. A. Yates, of the Kansas State Teachers College, to study mine gases, mine timbering, safety lamps and other subjects, a knowledge of which is necessary to pass the state mine examination.

The assessment of \$1 a week levied on members of District 14 (Kansas), United Mine Workers, for each week a member worked, for the relief of the unemployed, has been discontinued. On Dec. 1 the special fund showed a surplus of \$15,000 from the money paid in since June 1. At the same time that members of the district were notified that the one special assessment had been discontinued they also were informed that another assessment of \$1

a week for December and January had been levied for reimbursement of the general fund.

### KENTUCKY

The West Kentucky Coal Bureau's annual meeting and election will be held at Louisville Jan. 13. W. G. Duncan, of Greenville, is president.

The slow coal market at the present time and low prices in effect have resulted in operators of striking mines in western Kentucky losing interest in trying to get such mines running for the time being. So far there hasn't been much progress made in the Central City section, where the strike is now nearly eight months old.

A report from Barbourville is to the effect that core drilling with six outfits has started on Henry Ford coal properties in eastern Kentucky, which were purchased from the Peabody Coal Co., in Clay and Perry County. Much of the acreage is off railroads and will have to be proved before opening. A good deal of it is alleged to contain small seam coal. However, there are 80,000 acres to be proved and some of this represents mighty fine coal land.

A. S. Bennett, secretary of the Workmen's Compensation Board, reporting to Governor Fields, on the board's activities for the year ending June 30, 1924, showed a total of 11,573 coal mine accidents out of a total of 28,133 accidents recorded. There were 27,569 males injured and 564 females. There were 15,447 agreements approved, involving payments of compensation amounting to \$1,459,637.62, and to injured employees or dependents of deceased employees \$303,638.64 was awarded.

### MASSACHUSETTS

The Massachusetts Special Commission on the Necessaries of Life, following an investigation of coal deposits in southeastern Massachusetts, has recommended to the State Legislature that an appropriation of \$50,000 be made to pay for an exhaustive investigation on the part of a special state commission into the quality as well as the commercial quantity of such coal available.

### MONTANA

Montana's coal output has slumped during the fiscal year 1924, along with that of most other states. The report of Inspector George N. Griffin, just out, shows that 3,035 men were employed, producing 2,988,799 tons. In Montana's banner year—1920—4,108 men produced 3,381,840 tons.



## NEW YORK

The first meeting of creditors of the Lake Erie Coal Co., Buffalo, was held Dec. 15 in bankruptcy court, when Rumsey Wheeler was appointed trustee and Frank Fitzpatrick attorney. No schedule was presented.

## OHIO

J. W. Richardson, general manager of the Splashdam Coal Co., of Splashdam, Va., was a recent visitor to Cincinnati equipment people concerning proposed betterments to the plant.

The Central West Coal & Lumber Co., of Columbus, will soon start the rebuilding of the tippie and power plant at Mine No. 24, near Jacksonville, Athens County, on the T. & O. C. R.R. which was destroyed by an explosion several weeks ago. Machinery for a shaker screen, picking table and loading boom will be ordered soon and work of construction will be pushed. Nothing definite has been discovered as to the culprits causing the explosion. Mine No. 68, nearby which was slightly damaged at the same time, has been in operation almost continuously since the disaster. The loss was in the neighborhood of \$50,000 and that amount will be expended on the new plant. It is planned to use loading machines in the mine when reopened as four such machines are now being used in Mine No. 68.

Federal court has approved an order for the sale of the three Ohio mines of the Maynard Coal Co., located in the Pomeroy field, at auction at Pomeroy, Meigs County, Jan. 7. At the same time an order was issued for the sale of the three mines in the Hazard field, Kentucky, at Hazard, Perry County, Jan. 10. In each field there are three mines, all well equipped. The capacity of the three Kentucky mines is about 3,000 tons daily and that of the three Ohio mines about 1,500 tons daily. William S. Haman and Frank L. Stein, of Columbus, are the receivers.

Following the return of the Hazard Jellico Coal Co., which was operated by Jewett, Bigelow & Brooks prior to the bankruptcy proceedings, to the Harvey

Coal Co., its original owners and from whom it was purchased on a payment plan, a new corporation has been formed with C. H. Harvey, president; F. L. Fisher, vice president, and Fritz Staub, secretary and treasurer. This will be known as the Harvey Coal Corporation and it is now in full charge of the operations at Harveytown, Ky.

Suit has been brought by the Essex Coal Co., of Columbus, against the Northern Fuel Co., of Toledo, asking for the appointment of a receiver for the Toledo company. The claim is made that there is an unpaid judgment.

## PENNSYLVANIA

The John Mitchell Mutual Life Insurance Co. has elected officers and will start the issuance of policies on Jan. 1. It is a United Mine Workers organization, although independently controlled. J. J. Helferty, of Hazleton, has been elected president. The first policy will go to Chris Golden, of Shamokin, president of District 9, United Mine Workers, whose efforts in behalf of the concern have figured prominently in its successful organization.

The Lehigh Valley Coal Co. has declared an initial dividend of \$1.25, payable Jan. 31 to certificate holders of record Jan. 15.

Michele Bassi and Tony Pezzi, alleged bandits who shot and killed an express company guard during the holdup of a train carrying the payroll of the Ebensburg Coal Co. at Raxis, near Colver, on Oct. 11, and who got away with more than \$33,000, have been convicted of murder in the first degree in the Cambria County courts. A third member of the gang, Pete Antionucci, will be tried in January. The men were stopping at a hotel in Terre Haute, Ind., when arrested. The automobile used in connection with the holdup proved to be the one used in the holdup of the East End Coal Co. payroll of \$70,000 on July 30 in Lackawanna County. The verdict carries with it the death penalty under the Pennsylvania laws.

A deal has just been closed whereby Dr. John P. Hagg, of Williamsport,

becomes the owner of a piece of coal land in Karthus township, Clearfield County. Both the coal and surface rights are included in the deal. There are three veins of coal on the tract, some 6 ft. thick. It is estimated that the territory purchased will produce several million tons of coal. The land adjoins the holdings of the Snowshoe Independent Coal Co., of which Dr. Hagg is president. A railroad siding has just been completed to the company's holdings.

## TENNESSEE

The J. G. White Corporation is understood to have effected a combination of several large coal and iron ore properties, blast furnaces and similar plants in the Chattanooga district. The total involved is reported to be between \$8,000,000 and \$10,000,000. Among the companies said to be involved in the merger are the Roane Iron Co., the Tennessee Consolidated Coal Corporation, the Bon Air Coal Mines, the Chattanooga Coke & Gas Co. and the Chattanooga Iron Co.

## UTAH

The Blazon Coal Co., of Salt Lake City, a mining concern, has been granted a permit to offer for sale 94,801 shares at \$1 per share.

The Independent Coal & Coke Co. has filed suit against the Receiver of the Denver & Rio Grande Western R.R. for \$2,254, alleged to be due for losses sustained through fire caused by the railroad's negligence. It is claimed that the coal company lost the amount mentioned in lumber and wooden pipe as a result of a fire caused by sparks from the engines of the railroad.

Zeth Thomas, superintendent at Castlegate for the Utah Fuel Co., has resigned and gone to St. George, in southern Utah, where he will make his home for the winter. He will be succeeded by Mine Supt. T. A. Stroup, of the Clear Creek group of mines. Mr. Stroup will be succeeded by J. W. Littlejohn, chief inspector of the company's property at Sunnyside, and a brother of General Supt. William Littlejohn.

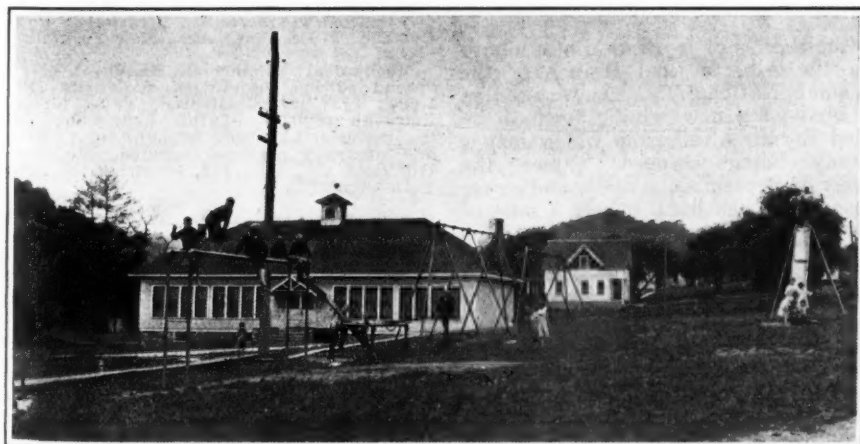
## VIRGINIA

Ira Cochran, commissioner of the American Wholesale Coal Association, Washington, was the guest of the Hampton Roads Coal Association and the Norfolk Wholesale Coal Association last week. He addressed the association on the subject of the operations of his association, and inspected the coal terminals.

## WEST VIRGINIA

The American Coal Co. of Allegany, for the ten months ended Oct. 31, 1924, reports net earnings of \$208,117 after depreciation but before taxes, which compares with net earnings for the year ended Dec. 31, 1923, of \$915,000.

The Goodwill Coal & Coke Co., operating in Mercer County, in the Pocahontas district, has virtually completed



Courtesy Bertha-Consumers Co.

## Playground at Rachel Mine

If fresh air and fun make healthy and happy children, then the younger generation in the vicinity of Downs, W. Va., where this operation of the Bertha-Consumers Co. is located, need no commiseration, for their wants have been well provided for by the coal company.

extensive repairs and alterations to its tippie. The mine of the company is one of the oldest in the Pocahontas section. About 600 men were idle for two weeks while the changes were being made.

The supply tippie of the Elk Lick Coal Co., near Richwood, recently was destroyed by fire. The Elk Lick mine is owned by the Cherry River Boom & Lumber Co.

Preparations are being made by A. J. Thompson and associates, of Titusville, Pa., to install a plant near Flint, on the Durbin branch of the Western Maryland Ry. Tests have indicated the existence of the Sewell seam with a thickness of about 42 in., over an area of from 600 to 800 acres. The coal found by tests shows a little better analysis than the New River coal found in Rich Mountain. Between \$25,000 and \$30,000 will be expended in preliminary development work under the direction of Oren Kelly.

Fire, believed to have been of incendiary origin, recently entirely destroyed the Recreation Hall at the Grant Town operation of the New England Fuel & Transportation Co. The building together with its contents was valued at \$20,000. It was impossible to save the building or any of its contents and a force of volunteer firemen devoted their efforts toward saving adjoining buildings. The building contained bowling alleys, pool tables, a moving picture theatre, club rooms and all the necessities for a community center. The fire followed shortly on the heels of a rumor that the recreation hall was to be used as a rooming house.

The Marshall Coal Co., operating at Mt. Clare, in Harrison County, sustained a loss of about \$1,000 when six mine dwellings were destroyed by fire, the blaze starting as the result of a defective flue in dwelling No. 3.

The Bethlehem Mines Corporation, a subsidiary of the Bethlehem Steel Corporation, resumed operations Dec. 15 on an open shop basis at its Dakota mine, in Marion County one of the largest mines in northern West Virginia. The mine had been closed down since April 1, when the company declined to sign the Jacksonville agreement. The Dakota mine has a capacity of from 40 to 50 cars a day. Although the mines of the Bethlehem company on the Morgantown & Kingwood have been operated open shop for some time, the Dakota and Barrackville mines acquired from the Jamison Coal & Coke Co. were operated as union mines up until April 1.

## WISCONSIN

A court order has set Jan. 5 as the date at which the Reeves coal dock at Superior, will be sold. The property of the company in the Twin Cities also will be sold. It is rumored that the president of the company will endeavor to get together enough capital to buy the Superior dock, in accordance with former plans announced some months ago. It is definitely stated that Henry Ford is not interested in the defunct company.

## CANADA

Carbon, Alta., on the Canadian Pacific Ry. in the southern part of the province, promises to develop into a mining town of considerable importance within the next few months. The Carbon Coal Co. has obtained extensive concessions and, according to a statement of H. Ransford, South Wales capital has been interested in the venture and work will be begun on a large scale immediately negotiations have been completed.

A readjustment of duties on United States coal so as to afford adequate protection to the coal industry of the Maritime Provinces and a careful investigation of the tariff on coal and semi-finished steel products was urged by a delegation headed by Premier Armstrong of Nova Scotia which waited upon the Federal Government at Ottawa last week.

T. J. Brown, Deputy Minister of Mines of Nova Scotia, has notified Malcolm Blue, general manager of the Nova Scotia Steel & Coal Co. that the company cannot continue to have policemen and watchmen tend the fans in the Albion mine near Stellarton. They must be replaced by members of the United Mine Workers according to the decision of Mr. Brown, whose attention was called to the situation by Thomas Scott, district board member of the miners' union for the Pictou territory.

Norman Harvey, acting on behalf of the Vancouver Harbor Commission, has just completed a survey of coal deposits in Alberta province in connection with a report to be issued in the near future by that body. The commission intends to classify the coals of Alberta and British Columbia under their respective heads and review the feasibility of marketing certain kinds through Vancouver port.

The Northern Alberta branch of the Canadian Institute of Mining and Metallurgy has elected the following officers for the ensuing year: Norman Fraser, chairman; David Jones, vice-chairman; H. M. Roscoe, secretary; L. C. Stevens, treasurer, and an executive committee composed of K. Campbell, A. C. Dunn, T. Hollies, J. W. Cashmas and J. A. H. Church.

Ninety days of work on a site alongside the Alberta Coal Branch of the Canadian National Ry. has resulted in the birth of a new mining town to be called Bryan, Alta., from which coal is already being shipped. Since the middle of September a tippie and power house have been built, nearly a mile of railway, with three switches constructed and a 325 ft. shaft sunk to the coal. The mine has an anticipated output of 1,000 tons a day. Officials in charge of the new mine are as follows: James H. Bryan, president; Charles Robertson, vice-president; John R. Macdonald, general manager and superintendent; Colin McGillivray, master mechanic, and Fred McKenzie, accountant.

Owing largely to the strike last summer the year's coal production in Alberta will not equal that of the previous year. Figures recently issued show a

total output of 6,866,923 tons during 1923 and a total of 3,589,884 up to the end of October of the present year.

"No evidence whatever was adduced at the inquiry to support the theory of a combine among either Winnipeg coal dealers or Alberta operators," declared Howard Stutchbury, Trade Commissioner for Alberta, on his return from Winnipeg, where he spent two weeks attending the government investigation into alleged conspiracies to keep up the price of coal in the prairie city. The inquiry was begun at the instigation of A. B. Hudson, a Winnipeg coal dealer who professed knowledge of a combine in that city, which he thought was preventing him from buying Alberta coal as he wished.

## New Companies

The Canyon Coal & Lumber Co. has been incorporated in Salt Lake City, Utah, by H. E. Havenor, as president; Chas. Kelby, as vice-president, and Alta Snyder, secretary-treasurer.

The Trumbull-Warner Coal Co., Cleveland, Ohio has been incorporated with a capital of \$100,000 to mine coal and deal in coal and coke. Incorporators are Norman A. Emery, Charles F. Ohl, T. Lamar Jackson, Donald J. Lynn and C. Kenneth Clark.

The Storm King Fuel Co., Hazard, Ky.; capital \$25,000, has been chartered by William F. Mandt, Lewis E. Harvie, W. W. Reeves and P. T. Wheeler.

The Green Coal Co. has been formed to operate at Madison, in the Boone County field of West Virginia. This company is capitalized at \$100,000. Principally interested in the new concern are: E. J. Goodrich, D. W. Hill, H. D. Battle, H. B. Stubbs and D. C. Howard, all of Charleston.

Canadian Amalgam Fuel Co., Ltd., of Windsor, Ont., has been incorporated with a capital of \$40,000, to manufacture and deal in fuel. Robert McDonald, Fred A. Brandt and S. G. Bawden are provisional directors.

## Publications Received

**Miners' Wages and the Cost of Coal**, by Isador Lubin. Pp. 320; 5½x8 in. Price, \$2.50. An inquiry into the wage system in the bituminous-coal industry and its effects on coal costs and coal conservation. The book analyzes the peculiar wage system that has been developed in the bituminous field and shows how this system has affected the earnings of the miners, the cost of producing coal and the exploitation of our coal resources. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

**Mechanical Engineers' Handbook**—New second edition, by Lionel S. Marks. Pp. 2,000; 4½x7 in.; illustrated. Price \$6. A thorough revision of this handbook. All the material has been brought up to date and much new material included. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

**Annual Report of the Mines Branch of the Province of Alberta, Can., for 1923.** Pp. 339; 6x9 in.; tables.

**Flame Safety Lamps**, by J. W. Paul, L. C. Illsley and E. J. Gleim, Bureau of Mines, Washington, D. C. Bulletin 227. Pp. 212; illustrated. Price, 50c. Gives detailed account of development of present safety lamps from those of Davy and Stephenson; discusses lamp-testing stations and tests made by various governments and by the U. S. Bureau of Mines; also describes devices and methods for testing for methane in mine air.

**Are Welding Handbook**, by C. L. Holslag. Pp. 243; pocket size; illustrated. Price \$2.00. McGraw-Hill Book Co., 370 Seventh Ave., New York City. Complete working manual for welding operators and those who supervise welding jobs.



## Association Activities

The fifteenth annual convention of the **Winding Gulf Operators' Association** was held at the Hotel Washington, Beckley, W. Va., on Tuesday, Dec. 16. Routine business in connection with trade conditions, tonnage, production and the market situation were given special attention. The officers elected for the ensuing year are: E. E. White, of Glen White, president; P. M. Snyder, of Mount Hope, vice-president; George Wolfe, of Beckley, secretary, and A. W. Laing, of McAlpin, treasurer. W. A. Richards was made a member of the executive committee in place of W. A. Ruby, resigned. Among those attending the meeting were: G. P. Caperton, of Charleston; F. M. Lee, of Alpoca; W. A. Richards, of Ashland; W. B. Beale, of Fireco; L. Epperly, of Winding Gulf; C. H. Mead, of Beckley; T. H. Wickham, of Beckley; Fred G. Wood, of Amigo.

## Trade Literature

The Ohio Electric & Controller Co., Cleveland, Ohio, recently issued Bulletin 204, describing the **Ohio Fractional Size A.C. and D.C. Motors**, 12 pp., and the **Ohio Motor Application Bulletin**, 12 pp. Both bulletins are 6x9 in. and illustrated.

**Footo IXL Speed Reducers.** Footo Bros. Gear & Machine Co., Chicago, Ill. Catalog No. 24. Pp. 14; 8½x11 in.; illustrated. Describes the construction and use of reducers to reduce the speed of electric motors.

**Westinghouse Fittings for Pipe Structures.** Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Circular 1676. Pp. 35; 8½x11 in.; illustrated. Describes interchangeable pipe fittings for structural work, giving their application to erection of outdoor substations, switching equipment, switchboard frames, etc. An adjustable insert for fastening machinery or other equipment to concrete floors, walls or ceilings is also illustrated and described.

The Westinghouse Electric & Mfg. Co. recently issued a 16-page booklet, 4x7 in., entitled **Westinghouse Precision Instruments**, devoted to the construction, operation and performance of precision voltmeters, ammeters and wattmeters. The booklet is known as Folder No. 4603.

Allen-Bradley Co., Milwaukee, Wis., recently issued the following: Bulletin 600, alternating-current resistance starters. Bulletin 640, type H-1852, semi-automatic resistance starter. Bulletin 740, type J-3052, automatic resistance starter. Bulletin 720, type J-1552, across-the-line starting switch.

**The Economy of Better Lubrication.** McCord Radiator & Mfg. Co., Detroit, Mich. Pp. 22; 8x11 in.; illustrated. Descriptive of the company's Class B lubricator, adapted to small steam engines, oil engines, gasoline engines, air compressors, steam pumps and auxiliaries. Over-all dimensions and price lists are included. This company has also issued Class BA catalog, describing the lubrication of steam shovels, cranes, dredges, hoisting engines and coal- and ore-handling apparatus.

**Coal and Ash Handling Machinery.** The Jeffrey Mfg. Co., Columbus, Ohio. Catalog No. 385. Pp. 212; 8x11 in.; illustrated. This book is composed of thirteen sections. No. 1 is devoted to pivoted bucket carriers, No. 2 to V-bucket conveyor, No. 3, bucket elevators; No. 4, power-house weigh laries; No. 5, track hoppers, plate feeders and bin valves; No. 6, scraper conveyors; No. 7, belt conveyors; No. 8, Steel apron conveyors; No. 9, pan and spiral conveyors; No. 10, skip hoists; No. 11, crushers; No. 12, coal-storage equipment; No. 13 mechanical draft fans. Typical layouts giving general dimensions accompany the tables of specifications for various equipments.

**Universal Conveyors.** Universal Conveyor Co., South Bend, Ind. Catalog C. Pp. 23; 8x11 in.; illustrated. Monorail and cableway conveyors as a solution of the dealers' coal-handling problems are described.

**Marion Model 350.** Marion Steam Shovel Co., Marion, Ohio. Bulletin 314. Pp. 35; 8½x11 in., illustrated. The Model 350 shovel and Model 360 dragline, equipped for either steam or electricity, are fully described. Among the latest developments for the new

Marion is the patented method of equalizing and leveling by hydraulic jacks.

**Roberts & Schaefer Co., Chicago, Ill.,** recently issued bulletin No. 59, illustrating and describing **Marcus coal tipples.** The bulletin contains 6 pp. and measures 8½x11 in.

**Sullivan Air Lift Pumping Systems.** Sullivan Machinery Co., Chicago, Ill. Bulletin 71-H. Pp. 47; 6x9 in.; illustrated. The different installations in which these systems are employed are described.

**Interlocking Safety Switch and Plug.** Crouse-Hinds Co., Syracuse, N. Y. Fourteen-page folder illustrating the use of safety switches and plugs with portable electrical appliances.

**Arcwall Coal Cutter.** The Jeffrey Mfg. Co., Columbus, Ohio. Bulletin No. 406. Pp. 8; 7½ x 10½ in.; illustrated. Describes the principal advantages of the arcwall coal cutter and its methods of operating.

## Recent Patents

**Caging Apparatus;** 1,490,006. Daniel F. Lepley, Conneville, Pa. June 3, 1924. Filed Oct. 22, 1921; serial No. 509,652.

**Hoist Skip;** 1,496,007. Daniel F. Lepley, Conneville, Pa. June 3, 1924. Filed Aug. 31, 1922; serial No. 585,540.

**Coal Drill;** 1,496,153. Edward J. Dooley, Peoria, Ill., assignor to Dooley Bros., Peoria, Ill. June 3, 1924. Filed May 17, 1922; serial No. 561,573.

**Mining-Machine Bit;** 1,496,203. Newton K. Bowman, North Lawrence, Ohio. June 3, 1924. Filed Jan. 26, 1921; serial No. 440,120.

**Method of and Apparatus for Transporting Materials in a Mine;** 1,496,196. E. G. Auld and G. E. Huttie, Scottdale, Pa. June 3, 1924. Filed Feb. 3, 1923; serial No. 533,775.

**Miner's Safety Glowlamp;** 1,496,261. L. E. F. Ferrette, Paris, France. June 3, 1924. Filed Feb. 17, 1922; serial No. 537,295.

**Mine Car;** 1,496,339. Wilbur D. Hockensmith, Irwin, Pa., assignor to Hockensmith Wheel & Mine Car Co., Penn. Sta., Pa. June 3, 1924. Filed April 24, 1923; serial No. 634,262.

**Coal-Loading Machine;** 1,496,513. Newton L. Barger and James H. Ford, Braeholm, W. Va. June 3, 1924. Filed March 17, 1921; serial No. 453,005.

**Mine-Car Coupling;** 1,496,553. Mike Meerdo, McDonald, Pa., assignor of one-half to Wm. Ash, McDonald, Pa. June 3, 1924. Filed July 16, 1920; serial No. 396,833.

## Coming Meetings

**American Engineering Council.** Annual meeting Jan. 16-17, 1925, Washington, D. C. American Engineering Council, 29 West 39th St., New York City.

**Northeast Kentucky Coal Association.** Annual meeting Jan. 22, 1925, Ventura Hotel, Ashland, Ky. Secretary, C. J. Neekamp, 816 Ashland National Bank Bldg., Ashland, Ky.

**American Management Association.** Annual convention, Jan. 28-30, Hotel Astor, New York City. Managing director, W. J. Donald, 20 Vesey St., New York City.

**American Wood Preservers' Association.** Twenty-first annual convention, Feb. 3-5, Congress Hotel, Chicago, Ill. P. R. Hicks, secretary, Service Bureau, 1146 Otis Building, Chicago, Ill.

**American Institute of Electrical Engineers.** Midwinter convention, Feb. 9-13, 1925, 29 West 39th St., New York City. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

**Northern West Virginia Coal Operators' Association.** Annual meeting, Feb. 10, Fairmont, W. Va. Executive vice-president, George S. Brackett, Fairmont, W. Va.

**American Institute of Mining and Metallurgical Engineers.** Annual meeting, Feb. 16-19, 1925, 29 West 39th St., New York City. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

**New England Coal Dealers' Association.** Annual meeting, March 25-26, Springfield Auditorium, Springfield, Mass. Secretary, C. R. Elder, 141 Milk St., Boston, Mass.

## New Equipment

### Electric Pyrometers Record Clear Indications

A complete line of indicating and recording pyrometers, together with the usual thermocouple accessories, was recently placed on the market by the Republic Flow Meters Co., of Chicago, Ill.

The clock of the pyrometer has a complete time element with the usual escapement and its own main spring. It performs no other function than to



### Wall-Type Indicating Pyrometer

A long scale is provided on the meter so that indications are clearly visible. Outside adjustments are made on a moisture-proof twelve-point rotary switch.

release operating energy periodically through the second or power escapement. No power passes through the timing escapement, and as a consequence the timing is not influenced by the quantity of reserve power that remains in the springs. The clock is an excellent time keeper.

In the recording type pyrometer two independent charts are used. With two separate sheets of paper, it is possible to have any combination of scale ranges desired. Six-inch charts are used on the duplex recording pyrometer. The actual scale range is 5½ in.

A tear groove below the driving drum permits extraction of the record instantly without waste of chart paper. A clutch on each driving drum enables one to operate either or both charts at will. The charts last 1,200 hours.

A carbon ribbon is automatically advanced across the face of the chart, and the instrument pointer moves freely between a depressor bar and the back of this ribbon. The pointer deflects in proportion to the temperature at the hot junction of the thermocouple and there is no frictional resistance at

the pointer. Just before the depressor bars come down, the carbon ribbon moves forward, covering the knife edge which runs the width of the charts and is located directly beneath the depressors.

When the carbon has advanced to cover the knife edge, the depressors drop, and a dot is made on the face of the chart. The depressors then rise, the carbon drops back, and the dot that has just been made is visible. In some instruments visibility is attained by having the carbon marking band on the under side of the chart, but this is not as satisfactory. All the charts used in these pyrometers have 20 deg. F. markings at each division. This is true even with the 3,000 deg. F. charts.

All the parts in the recording pyrometer are mounted on a swinging bracket. Every detail is visible and accessible. The bracket also forms a cover for the electric system which is attached to the back of the bracket. Two screws hold the bracket closed and the electric system is thereby thoroughly protected.

Fifty ohms' resistance is taken from the fixed resistor and placed in a variable rheostat having a scale of 25-0-25 ohms. These instruments are accurately calibrated for the external circuits stipulated, but if at any future time it is necessary to change the length of the extension leads, instantaneous and accurate adjustment can be made within the instrument.

A small toggle switch, which is plainly marked "on and off," is built into the instrument, which, when closed, short-circuits the magnetic field and damps the movement of the pointer when in transit. The meters have high resistance which assures accurate reading.

### Compressor Has Improved Type Governors

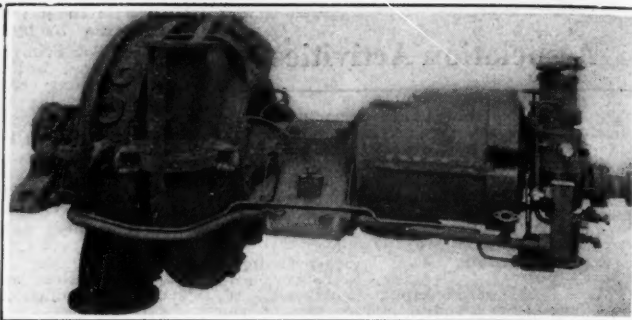
A new type multi-stage, centrifugal compressor, designed to supplement the line of single-stage machines recently developed, and supplied with improved control devices, is now being marketed by the General Electric Co. These compressors have been especially developed for furnishing various volumes at higher pressures than ordinarily obtained with single-stage machines. Compressors of this type are particularly suitable for pneumatic materials, handling systems, the agitation of liquids and drill machines.

The main line of compressors covers water-cooled machines designed to deliver volumes of from 3,000 to 60,000 cu.ft. per minute, at pressures up to 30 lb. or more. Two types of miniature, self-cooled machines, to deliver from 250 to 1,400 cu.ft. per minute, at pressures of from 2 to 6 lb., have been included in the group. All types are either motor or turbine driven.

Among the advantages claimed for the new compressors are higher efficiencies, simpler and stronger construction, thus minimizing mechanical difficulties. The large cooling capacity is expected to bring about greater efficiency, the conversion passages having been improved and the interstage passages simplified. Each complete unit has four bearings with an automatically lubricated flexible coupling. These

### Compressor Improved

This well-balanced compressor unit can deliver 8,500 cu.ft. of air per minute at a pressure of 17 lb. It is suitable for air hammer drills and is equipped with improved type pressure governors.



bearings are supported by the foundation or base under the machine. In addition to these changes, all the various governing devices for these machines have been improved, including constant-volume governors, constant-suction governors, constant-pressure governors, etc.

### Compact Ribbon Resistor

A ribbon-type resistor, wound on edge, has recently been developed by the Monitor Controller Co., Baltimore, Md. It is intended for service where cast-iron grids would otherwise be employed.

The resistor unit consists of a high-resistant alloy ribbon wound on edge in helical form and mounted on a steel-reinforced porcelain support which passes through the entire length of the unit and also supports and separates each convolution at two diametrically opposite points. This method of construction relieves the resistor ribbon from mechanical strain and permits thorough ventilation. The ribbon can

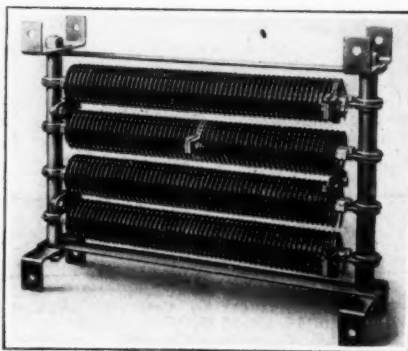


Fig. 1—Units Are Compact

Bank of four resistor units connected in series and stood on edge with feet turned outwards to show details of construction. There are only three joints in the whole bank, these being made by bridging clamps at the ends of the unit.

operate at any temperature up to red heat without sagging or in any way injuring the resistor as a whole.

By means of terminals and taps a unit may be connected into a circuit or interconnected with other units. Two simple forms of clamps provide all these facilities. One is a bridging clamp which makes solid mechanical connection between two adjacent units as shown in Fig. 3, and which serves as a terminal when the units are connected in parallel and also as an end tap, if desired, when the units are connected in series. The other may be used for either of two purposes—as a terminal clamp or as shown in Fig. 2. The taps may be placed at any desired point along the resistor and may be changed at will.

As the clamps may be used to join ribbons of different sections together at any point, tapered resistors of almost perfect design can easily be made.

The resistors are made in standard units and mounted in frames so that they can be applied in a manner similar

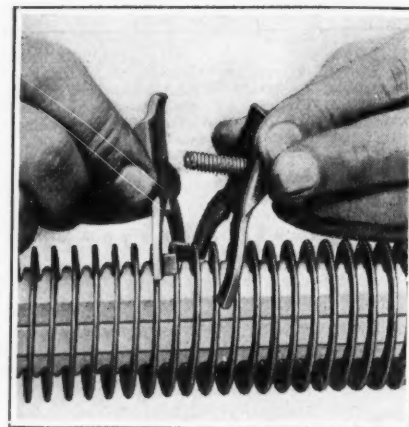


Fig. 2—How Taps Are Made

Clamp used for taking off tap. Same clamp is also used for effecting terminal connections.

to cast-iron grids. The standard section will contain either four or six units mounted horizontally and connected either in series or in parallel. Any number of these sections may be mounted one on top of another. It makes practically no difference whether the resistor as a whole is mounted with the units in a vertical or horizontal position. There are no joints in a resistor section except at the terminals. The ordinary cast-iron section has approximately fifty joints in addition to those at its terminals.

The porcelain used in the resistor being supported by steel is practically unbreakable.

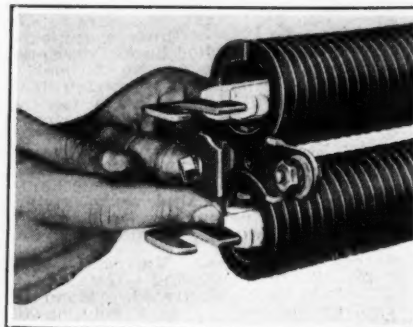


Fig. 3—Joining Sections

This type clamp is used for connecting adjacent units in parallel or series. It serves as terminal when units are in parallel, but also may be used for taking off intermediate taps whether units are in parallel or in series.



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## We Wish You A Merry Christmas

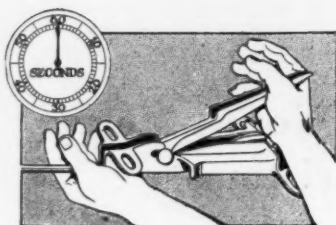
This day of all the year is full of good cheer and gratefulness, so chockful of happiness that we look forward to it as to an oasis in a desert, where we can take our fill of water from the well and dates from the lofty trees to sustain us through another year's journey.

But there should be no deserts. They are largely of our own making. The song of life should run along steadily year in and year out, only with a deeper, fuller note at Christmas.

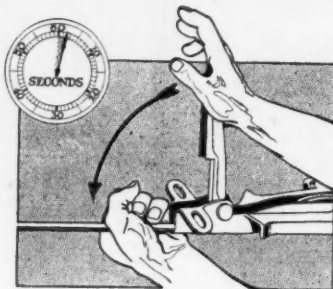
Men arrive at their goals as much by being as by planning. Inspiration to our friends and associates to help and serve us comes not so much by the depth of our thought to please as by the cheerfulness and friendliness of our character. If we put the briskness and freshness of Christmas day into our daily lives the seven devils of suspicion, dislike, fear, resentment, ungratefulness, anxiety and mental inertia will be driven out.

He who carries good cheer into his life has not only a good digestion for his food but a wholesome solution for his problems. He who is uninfluenced by imaginary wrongs and ills and unhampered by a gripful of unpleasant memories finds that despite many a discordant note the song of life is attuned always to his.

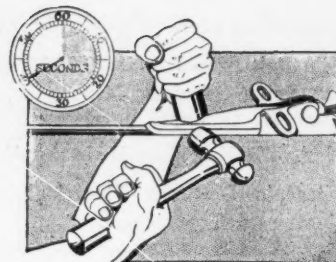
O-B Renewable Bronze Cam Tips are made with 6-inch approach lips and with 2½-inch approach lips. Where space permits the longer lips are recommended for easier wheel approach.



**1** The tip is inserted, up-side-down, under the hooks cast on the frog body.



**2** It is raised up, over and down onto the wire. The cam end forces wire down into groove.



**3** The lips are clinched around the wire, the whole job on one tip taking about 40 seconds. No nuts or bolts required.

O-B Renewable Cam Tips make O-B Trolley Frogs so easy to put up that they are correctly put up.

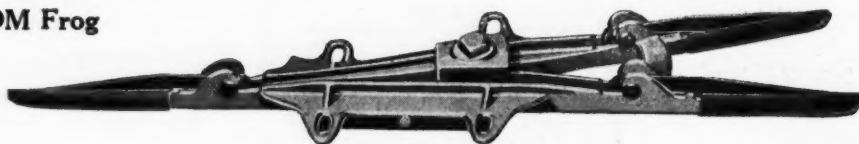
Try a Type D or a DM Frog at a heavy traffic point.



O-B Type DM Frog

2½- or 6-inch Cam Tips are interchangeable on all Frogs.

These two frogs are popular ones for mines. The DM is good for short radius curves as it is short enough to allow quick turnouts. The D makes a smoother passage for the trolley wheel and is recommended where track curve radius will permit.



O-B Type D Frog

# The Ohi **O B** Brass Co.

Mansfield, Ohio, U.S.A.

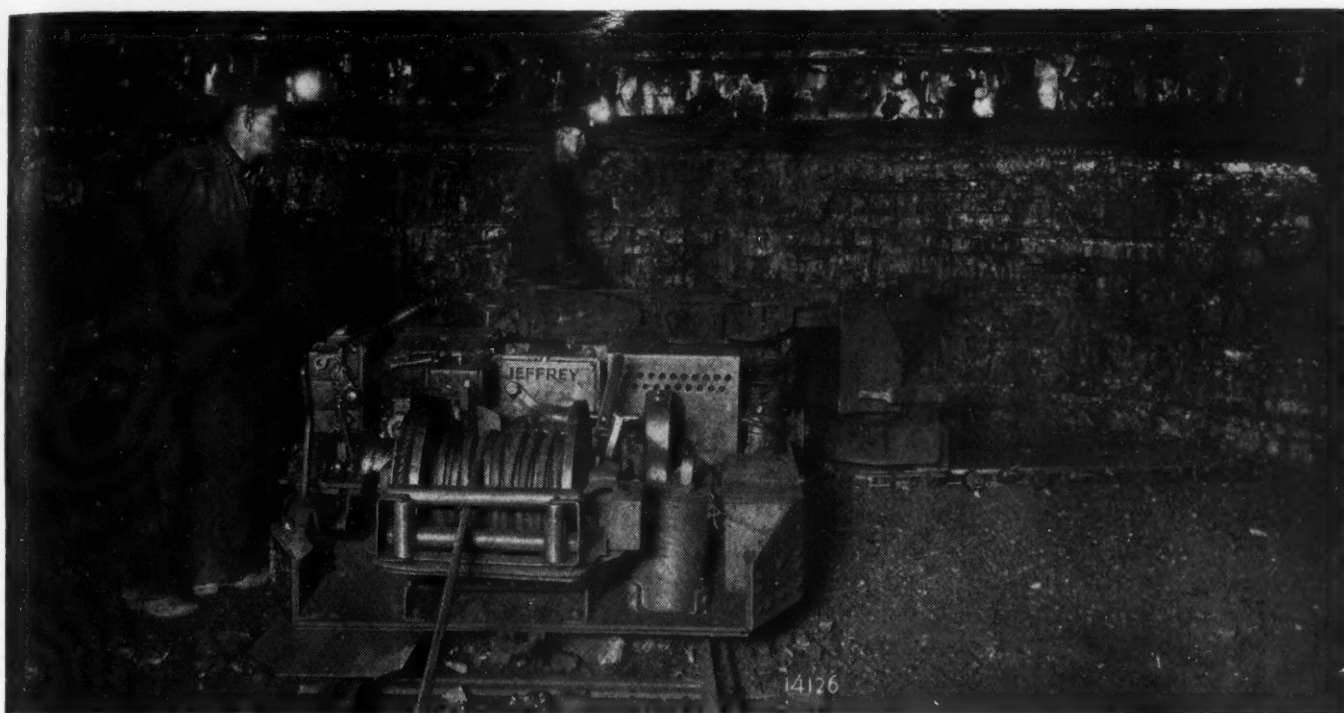
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*Jeffrey Arcwall Bottom Cutter cutting along bottom*

## ***Cuts Anywhere Between Roof and Bottom***

The Jeffrey 29-C Arcwall Coal Cutter can be adapted for cutting any place between bottom and roof; in the coal, or in shale bands or dirt. Adjustable while in operation to an irregular binder.

No time is wasted in loading or unloading as machine is operated on truck. Averages 20 to 30 working places cut in an 8-hour shift.

Produces more

lump as light charges of powder may be used. Insures cleaner and better coal at less cost.

The Arcwall Bottom Cutter permits undercutting on the bottom without interfering with track, leaving no wedge shaped portion and entirely eliminating expense of taking up bottom after a place is cut.

*Ask for Arcwall Bulletin No. 406-A*



*Jeffrey Arcwall Top Cutter for making top or center cut*

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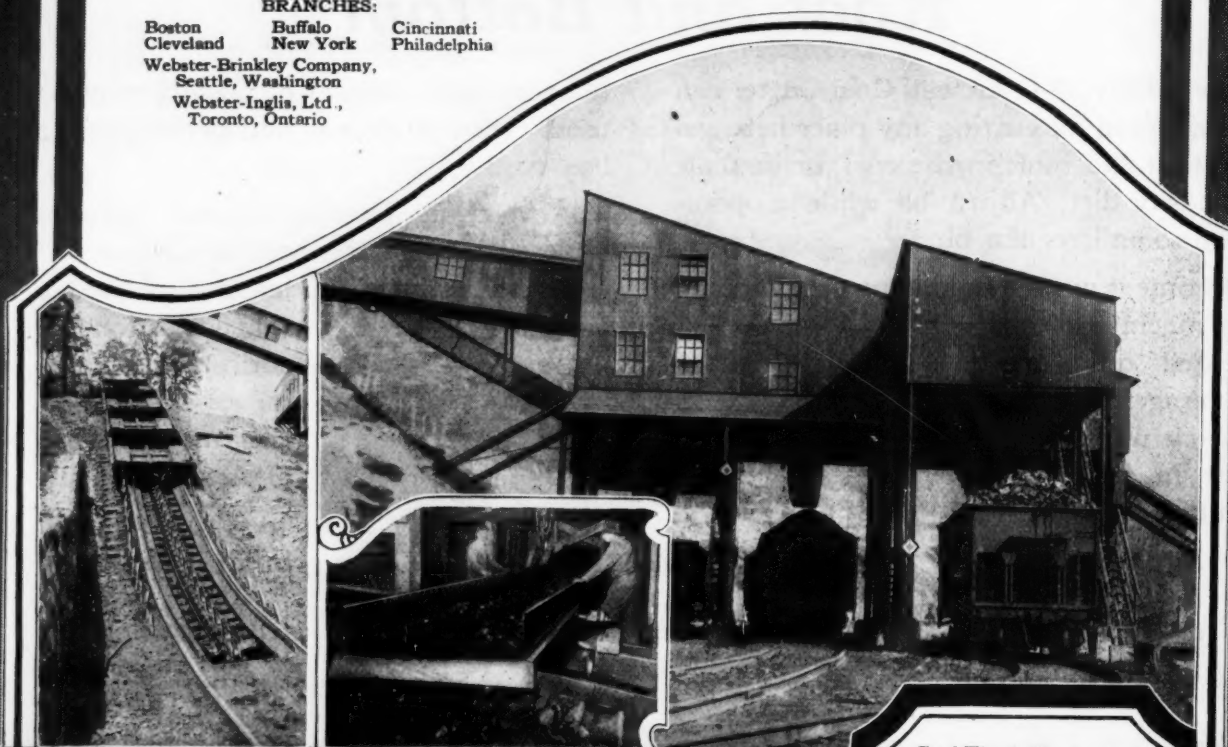
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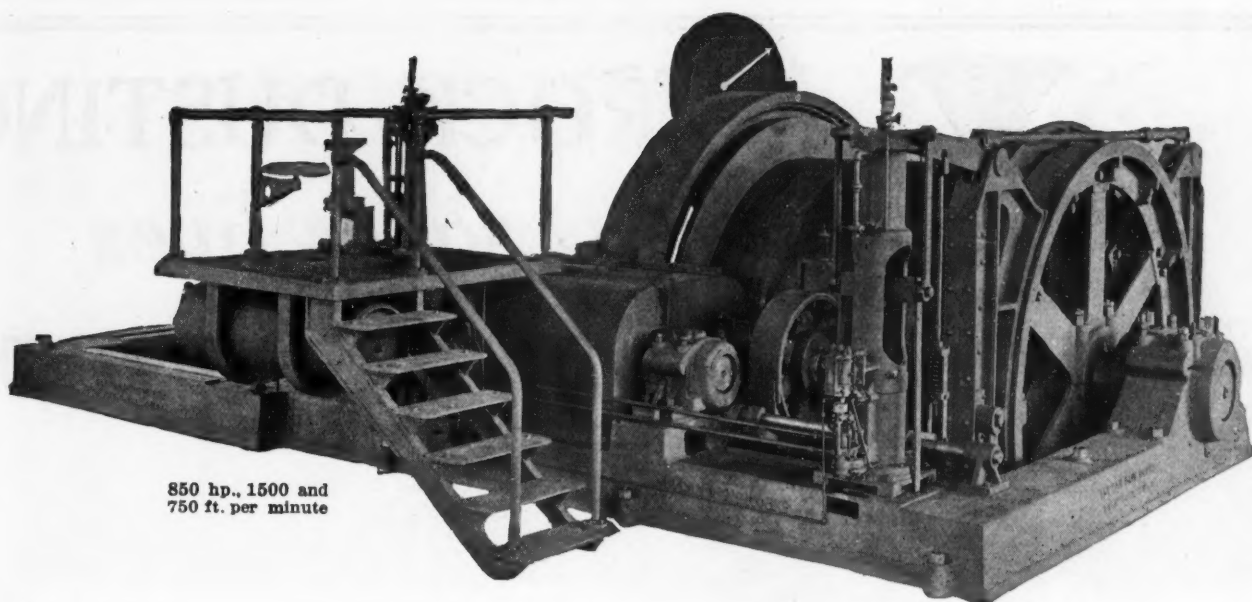
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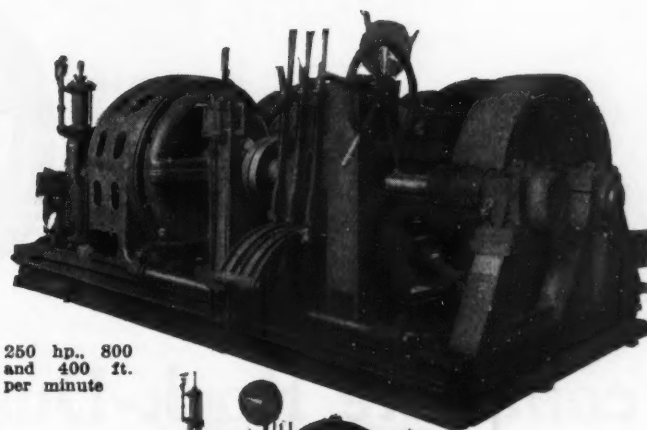
They are typically Vulcan products, dependable to the last degree, and are used in all parts of the world.

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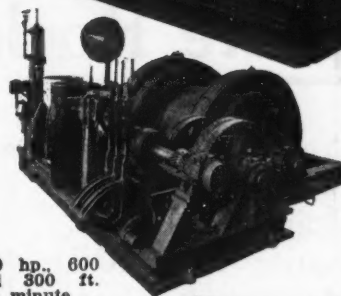
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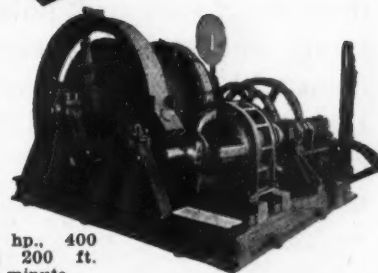
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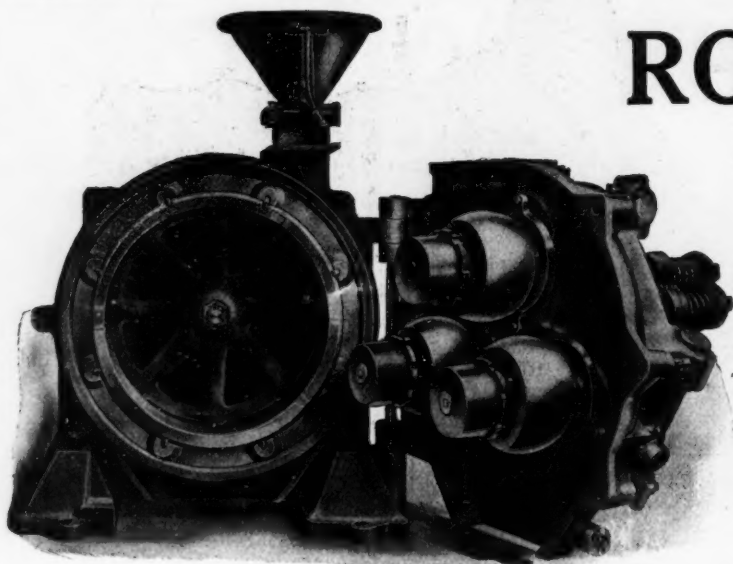
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and 300 ft.  
per minute



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and 200 ft.  
per minute

# VULCAN OF WILKES-BARRE HOISTS



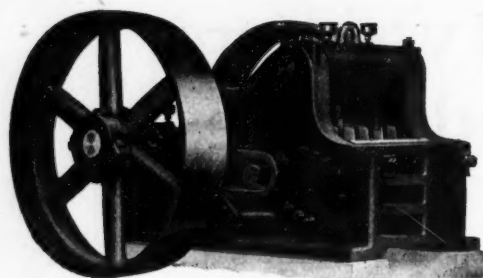


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## Orient, Lynch, Now Valier!

*8664 tons in a day, a new record*

A NEW WORLD'S RECORD was set Nov. 25, when the Valier Coal Co., in Southern Illinois, hoisted 8664 tons in 7 hr. 51 min. from a single shaft.

This beats the Orient mine record, (Chicago Wilmington and Franklin Coal Co.) of 8218 tons, made in March, 1922, and the Lynch, Kentucky, record (U.S. Coal and Coke Co.) of 12,880 tons, made Feb. 12, 1923 (but from two openings).

Coal hoisted in making all three records was undercut with

### SULLIVAN IRONCLADS

At Valier, 36 out of 39 continuous cutters in use are Sullivan A.C. Ironclads, equipped with 7½-ft. cutter bars, Tipturn trucks and self-winding reels. Most of these machines are 5 to 7 years old.

### SULLIVAN Roller Bit Sharpeners

—each served by a Miller automatic oil forge, sharpen all the mining machine bits used at Valier. During November, only 1.2 bits were sharpened for each ton of coal cut. Two men operate both sharpeners and forges.

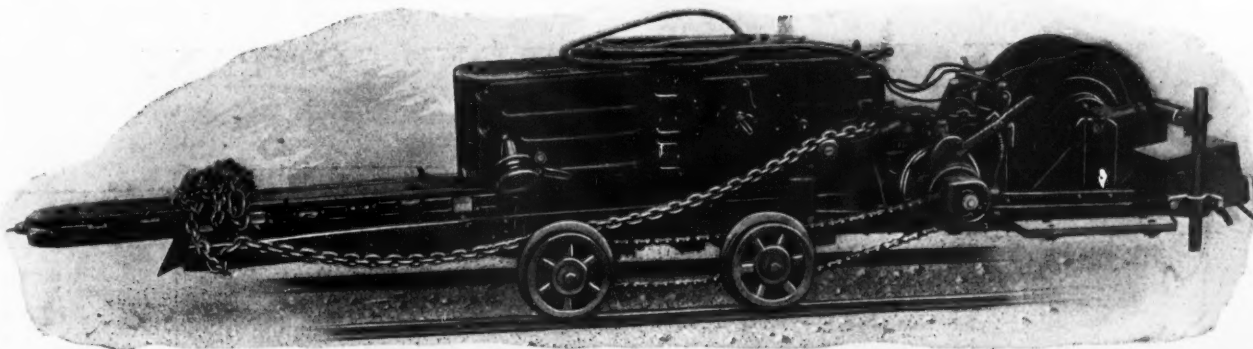
In making this record, 662 hand loaders filled 1920 cars, holding 4.51 tons each. The 600 cars made 3.5 trips each, on the average, traveling more than a mile each trip. The coal was dumped into a rotary dump at the bottom and lifted 660 ft. to the surface in 15-ton skips. 156 railroad cars were needed to haul away the day's output.

This record is no fluke, since on Nov. 26, 7763 tons were hoisted, and the average for December to the 12th was 7460 tons. (See Coal Age, Dec. 11, 1924).

Whether your mine is a record breaker, or of more moderate capacity, you can count on Ironclads to do their full share in your organization to keep production up, and costs down.

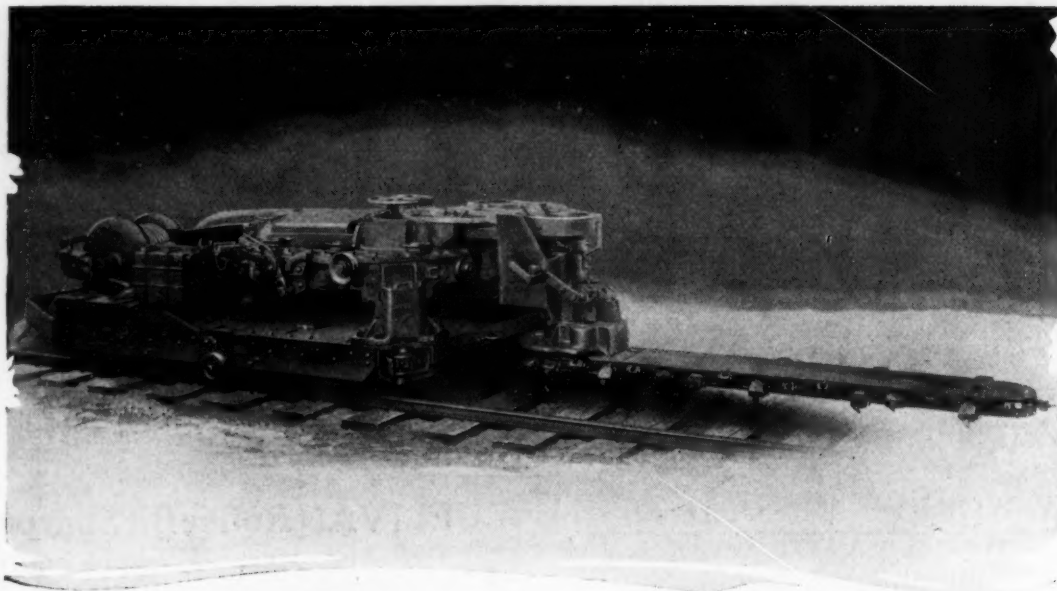
*Ironclads, Bulletin 79-DC*

*Cutter Bit Sharpeners, Bulletin 72-LC*



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## Always Full Quota Production With Ball Bearing Motors on Coal Cutters

**R**IGHT through every shift this coal cutter does its full quota of work.

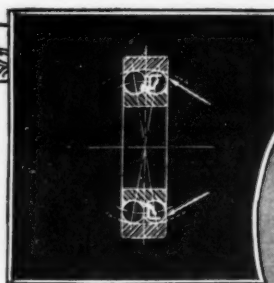
Reliability and endurance—these factors are essential if equipment is to stand up and give low-cost operation in the hard service of mining.

Skayef Self-Aligning Ball Bearings on the motors increase efficiency and guard against electrical troubles. Dust and grit are effectively excluded by sealed housings, which also prevent lubricant leakage on motor parts.

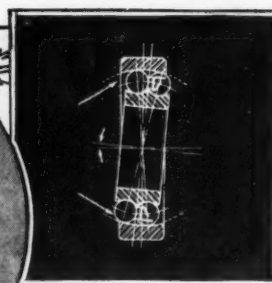
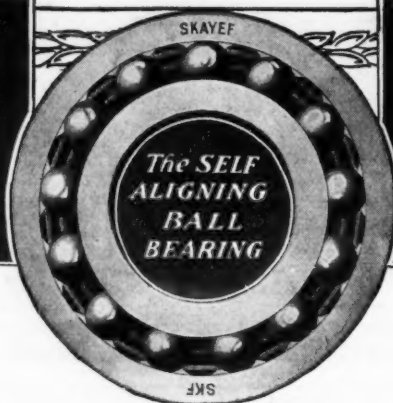
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Supervised by **SKF** INDUSTRIES, INC., 165 Broadway, New York City

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Normal View



Deflected View





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with the "CEMENT-GUN"  
in the mine of the

## Lehigh & Wilkes-Barre Coal Company

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Let us tell you all about the many uses for the "Cement-Gun" in your coal mine property.

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PURCHASED AND USED  
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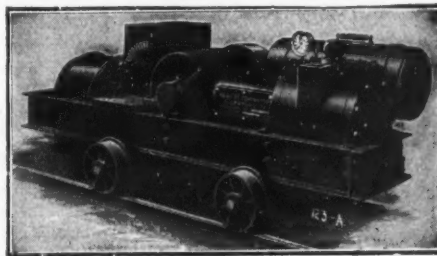
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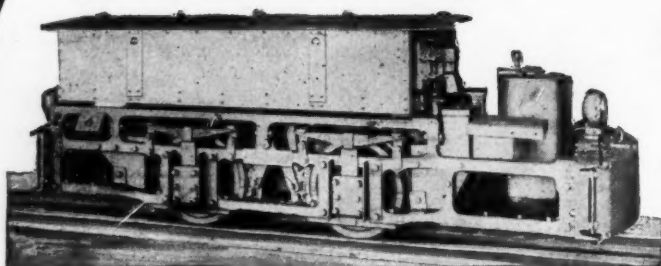
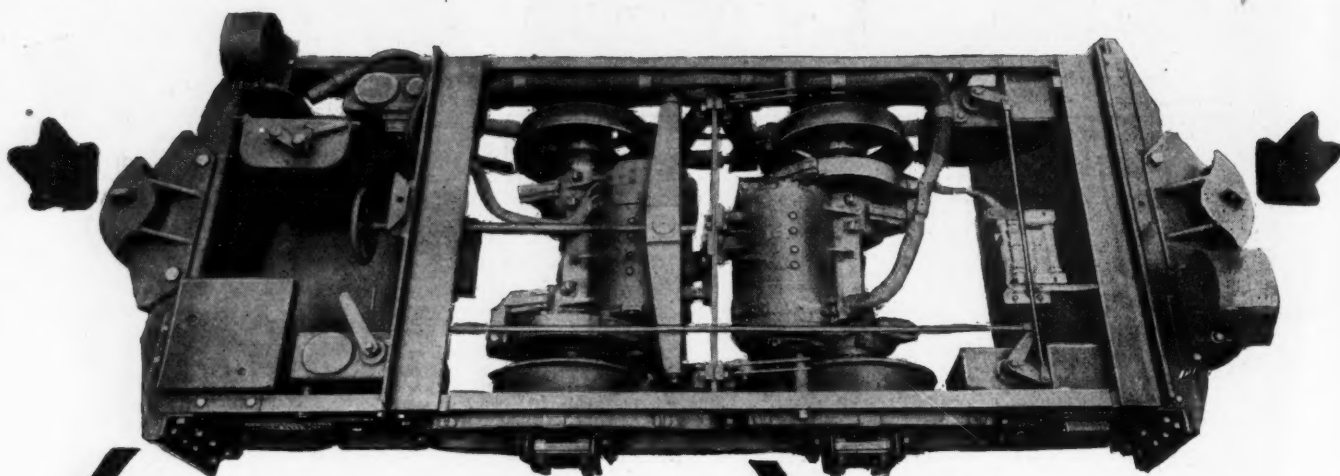
Foreign Agency:

International Cement-Gun Co., Zeist, Holland



No "Cement-Gun" is Properly Complete  
Without a TRAYLOR Compressor

# From End to End



## A Real Mine Locomotive

**EVERY** part of the Baldwin-Westninghouse storage battery locomotive, from the sturdy barsteel frame to the smallest motor detail, is built to serve the user unfailingly and to give the greatest mileage from one battery charge.



### Barsteel frame:

This strong frame construction is an aid to ventilation and gives ready access to all parts of the chassis for inspection, lubrication or repair.

### Motors:

The slow speed motors are specifically constructed for mining service.

### Control:

Field control of the motors saves power by cutting out resistance except on first and second speed points.

An ample clearance is provided between the motors and the roadbed.

The battery crate is mounted on rollers to facilitate its removal.

Heat treated gears of high grade material add to the efficiency of the locomotive.

For complete information, address the nearest district office of either company.

Westinghouse Electric & Manufacturing Company  
East Pittsburgh Pennsylvania

The Baldwin Locomotive Works  
Philadelphia Pennsylvania

# Westinghouse



# Reduce Shut-Downs

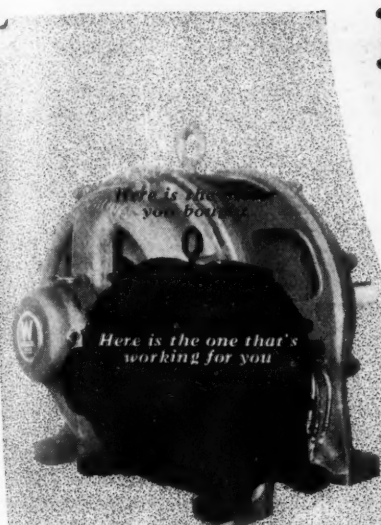
*with Westinghouse Automatic Switching Equipment*

**A**FTER you have paid a lot of good money for motors and locomotives why keep them standing useless because of mistakes of carelessness resulting in needless shut-downs when using a manually operated board.

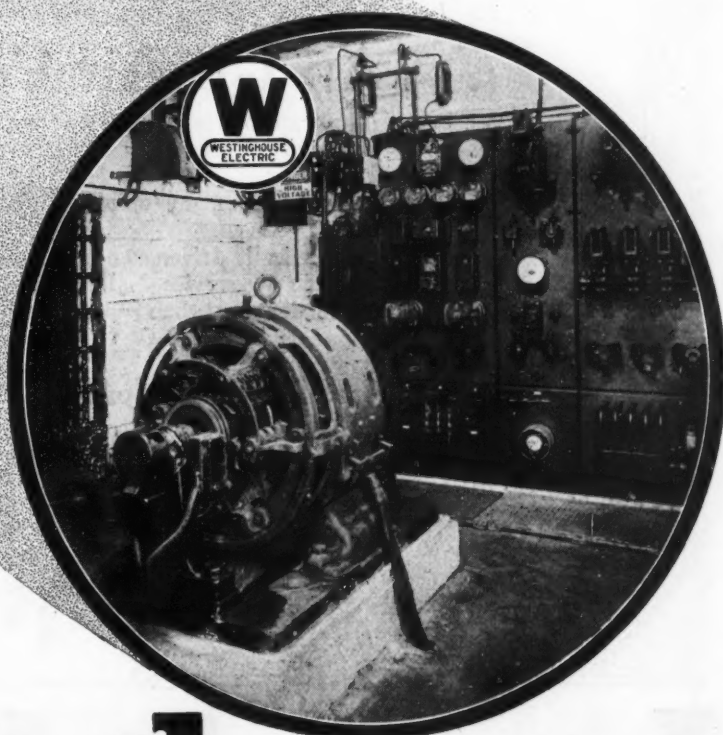
Automatic switching equipment can't make a mistake. It can't throw a running breaker in ahead of a starting breaker. It can't hold a starting breaker in until the coils of the auto transformer have been burned out. When the windings reach a dangerous temperature, it automatically shuts down the station until the danger is over. With automatic switching equipment a breaker can't be closed until the short circuit has been removed. Excessive heatings and overloads are taken care of automatically. Positive protection is always assured.

Replace the possibilities of human mistakes with mechanical certainty by specifying Westinghouse Automatic Switching Equipment for Substations.

Westinghouse Electric & Manufacturing Company  
East Pittsburgh Pennsylvania  
Sales Offices in All Principal Cities of  
the United States and Foreign Countries

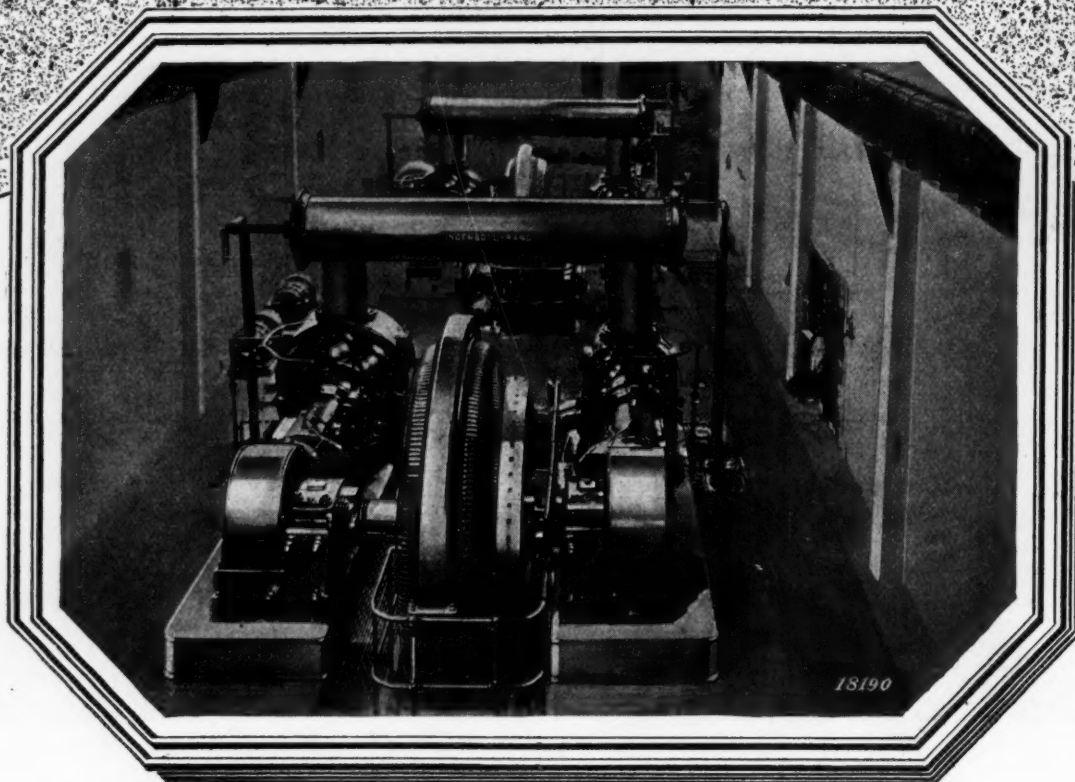


The solution—install  
Westinghouse auto-  
matic substations



# Westinghouse

# For the Mine



*Two large Class "PRE" Compressors installed in a large South American Copper Mine*

## An I-R Air Compressor

When you install a compressed air plant you count on making a permanent investment. You buy high efficiency and mechanical superiority on the basis that in the long run it will save money.

The Ingersoll-Rand Company builds only machines of the high grade you insist on having.

Class "PRE" electrically driven compressors, such as are installed in the above plant, will maintain reliable air service. They are doing this with less horsepower input per cubic foot of air delivered than is otherwise obtainable.

I-R Compressors are built in over 1000 sizes, types and capacities.

**Ingersoll-Rand Company, 11 Broadway, New York**

*Offices in principal cities the world over*

For Canada refer Canadian Ingersoll-Rand Co., Limited,  
260 St. James Street, Montreal, Quebec



# Ingersoll-Rand



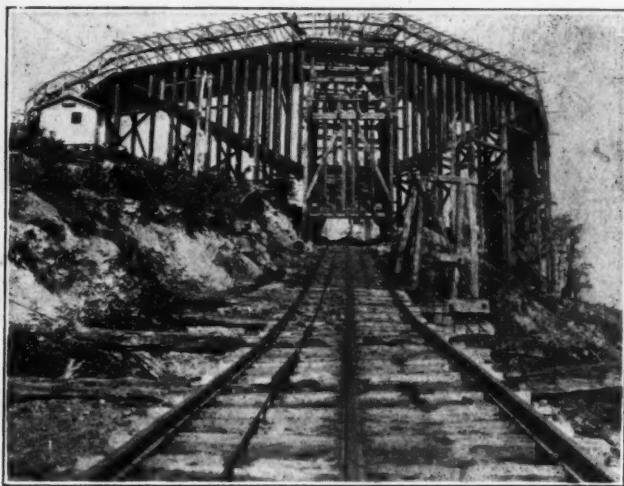
## Throwing Out Rotaries — Installing S. & D. Automatics

**Why? Because the Tremendous Saving Has Been Proved!**

This company operates two mines, and one of them has been equipped with "Automatics" for four years. They are now changing the other mine from rotary cars to "Automatic" Drop-bottom cars. Why? Because they KNOW it will pay. Their records PROVE that the cost will be saved in a few months—and then big dividends flow in.



AN AEROPLANE VIEW SHOWING THE NEW TIPPLE AND THE OLD TRACKS



A CLOSE-UP VIEW OF THE 600-TON STORAGE BIN TO BE FILLED AUTOMATICALLY BY THE AUTOMATIC CARS

Formerly they dumped four rotary cars at a time by machinery. Now they will have continuous operation without machinery. The "Automatics" are ten inches lower, and have a larger capacity. Proved and tested beyond question.

**The Real Money-Maker Will Do Likewise, and My,  
What a Golden Opportunity for the New Mine!**



UNLOADING 30 CARS A MINUTE WITHOUT LABOR OR MACHINERY

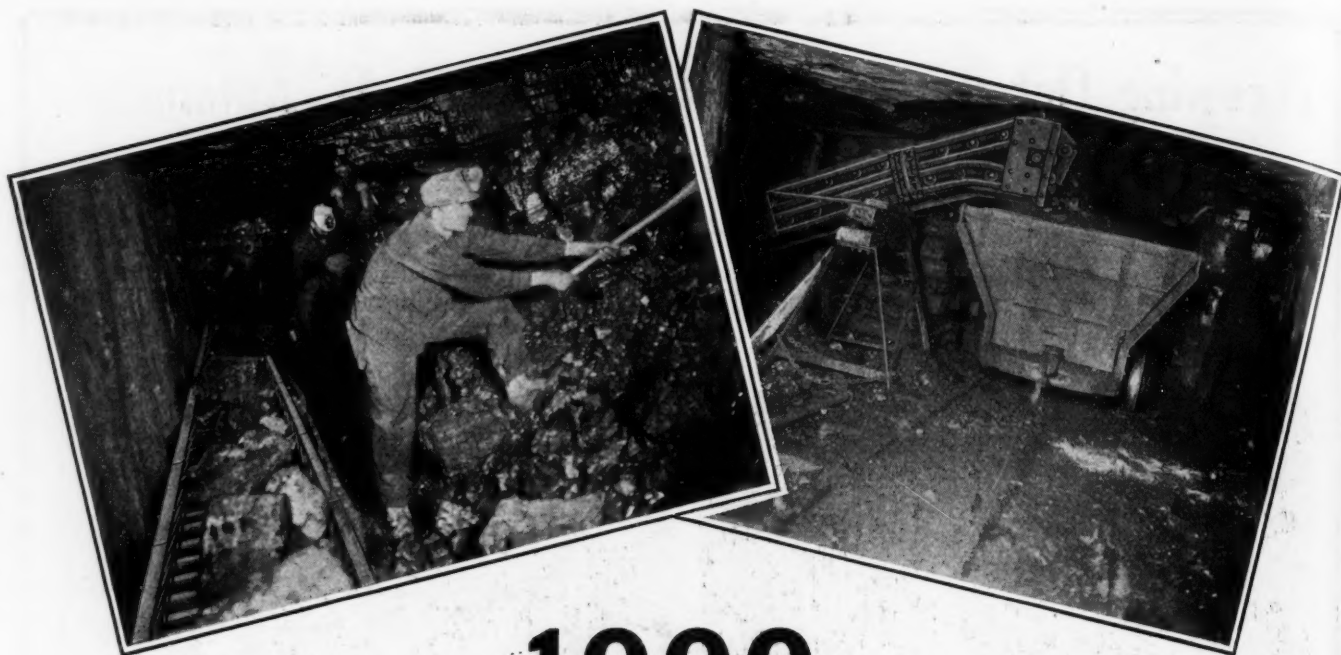
**Griffith Automatic Cars**  
" Now Equipped With  
**S & D Automatic Couplings**

*"The Car for Hard Times"*

**Sanford Day Iron Works**

**Knoxville, Tenn.**

*"Whitney Wonder" wheels and bearings guaranteed 5 and 10 years respectively.*



# 1000 tons a Day from a few Acres of Territory

It requires probably 200 acres of mine territory, average, to produce 1000 tons of coal per day; if this same tonnage can be produced from a very few acres of working territory—a very material saving in cost can be made.

Many operators are alive to this fact and are using concentrated mining methods by employing MOVOR Conveyors—the only underground conveyor with small interspersed drive units.

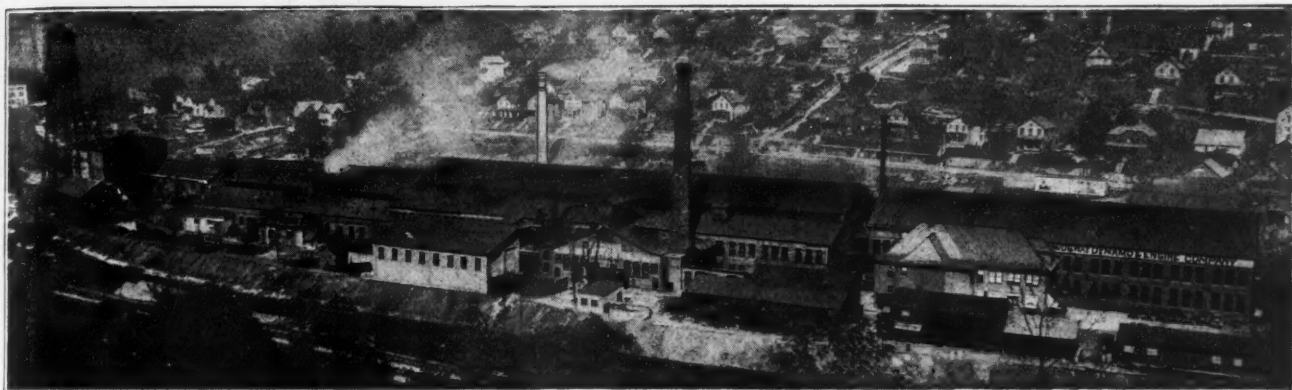
Write us for facts about the MOVOR Conveyor.

**The American Mine Equipment Co.**  
Farmers Bank Building, Pittsburgh, Pa.

# MOVOR



*Here's the Factory  
Not too big to give Service*



**Located in the Alleghenies, where bear and deer may still be found**

*We wish you  
A Merry Christmas  
and a  
Prosperous and Happy  
New Year*

the source of Ridgway Power Units may be of interest to the Coal Operators whom we have served for so many years.

We are proud of our factory and our organization. Not because the factory covers acres, nor because the number of our employees is legion, but because we are not so large as to be unable to give personal attention to the wants of our customers.

We attempt to give service. Sometimes we fail, but usually repair parts, when needed, are forwarded within a few hours after word of their need is received, and service men are dispatched promptly.

Our interest in keeping your plant operating is as great as your own and we try to do our share in promoting the welfare of this fundamental industry.

**RIDGWAY DYNAMO &  
ENGINE CO.  
RIDGWAY, PA.**

SALES OFFICES: BOSTON CHATTANOOGA CHICAGO CINCINNATI CLEVELAND DENVER  
DETROIT GRAND RAPIDS KANSAS CITY LITTLE ROCK MEXICO CITY MINNEAPOLIS NEW ORLEANS  
NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO WASHINGTON WILKES BARRE

# 160 to 480% Dividends

## from investments in automatic pump control

160

480

This is for the man who likes the compound curves in a dollar mark and who revels in dividend figures. For this financially minded man we have a story as amazing as it is true. The story of an investment that will, in most cases, yield from 160% to 480%. And it isn't a stock selling yarn either.

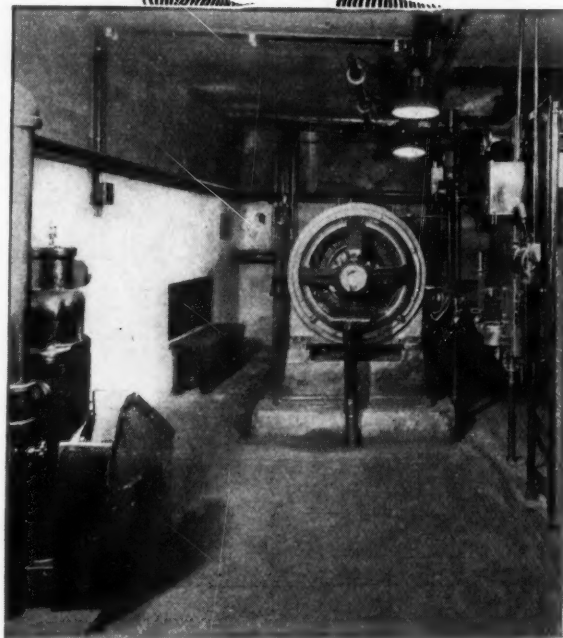
Here is the essence of the thing.

In certain cases centrifugal mine pumps can be made to operate automatically thus doing away with the usual pump runner and saving his wages. The savings vary according to wage rates, the number of shifts of men used, etc., but in general, operating charges are reduced sufficiently to pay the installation cost in six months or less.

The method used to make the pumps self-operating is a patented system that has been amply tried out and there is abundant evidence that the plan is practicable and dependable. The apparatus used is as simple and easily understood by the operating force as the usual electrical equipment and pipe fittings found around a mine. This equipment was made especially for mine service, by mine pump specialists and is giving entire satisfaction and producing profits for a number of mine operators.

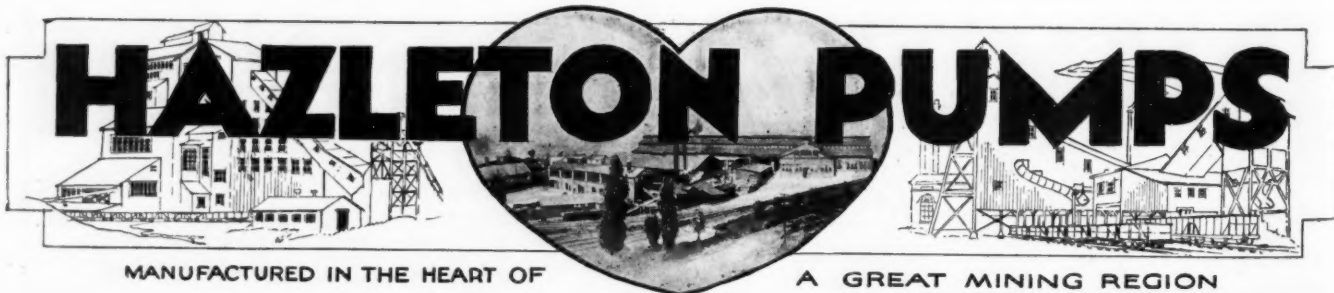
*Full details of this remarkable means of saving money will be gladly furnished.*

**BARRETT, HAENTJENS & CO.**  
Hazleton, Pa.



A typical automatic pumping station installed at one of the collieries of a large and well known anthracite coal company.

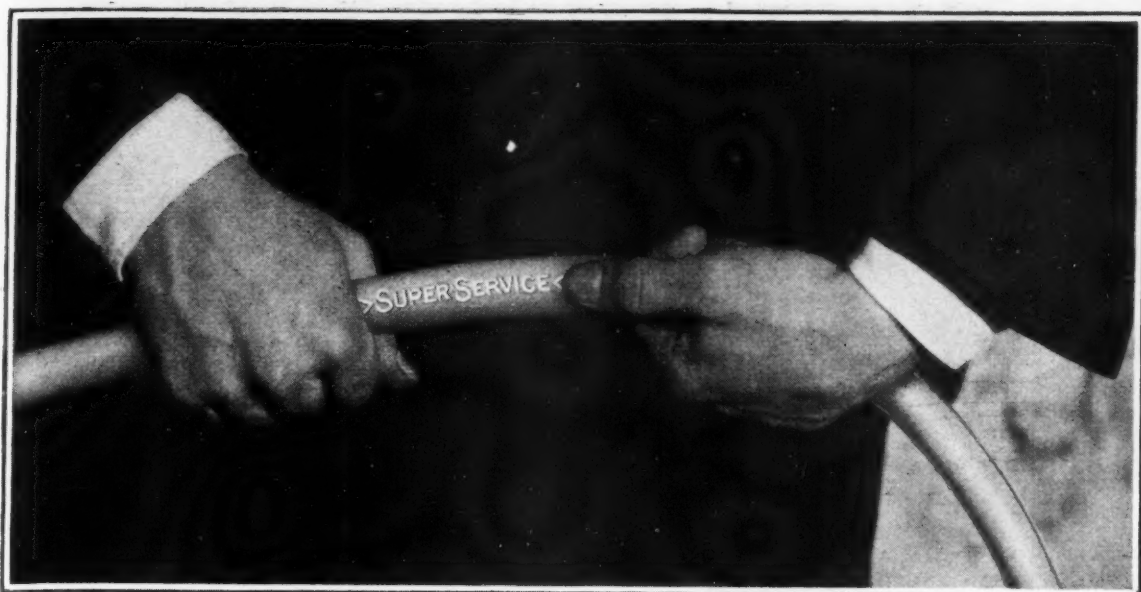
# HAZLETON PUMPS



MANUFACTURED IN THE HEART OF

A GREAT MINING REGION





## A mark— and its meaning

**Y**OUR favorite automobile tire is marked, your hat has the maker's imprint, your clothes the tailor's label.

This means that the producer is proud of his product, he sponsors it—he is sure of the satisfaction it will give.

For the same reasons Super Service Cord and Cable have an identifying mark. The name is an integral part. Every twenty feet the words "SUPER SERVICE" are embossed on the surface—easily felt and distinguished.

All Rome Super Service Cords and Cables are so marked, so you'll be sure of the genuine, the only rubber sheathed conductors vulcanized in steel molds under tons of pressure—and built for "Super Service".

The "Super Service" family covers a complete range of types and sizes—some small enough for a dentist's drill, to large cables two and one half inches in diameter—with every mining requirement included.

ROME WIRE CO. Mills and Executive Offices: ROME, N. Y.  
Diamond Mills, BUFFALO, N. Y.

NEW YORK    BOSTON    CHICAGO    CLEVELAND    DETROIT  
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LOS ANGELES, J. G. Pomeroy, 336 Azusa St.

### SUPER SERVICE

Write for booklet, price lists and samples of Super Service Cable, made for all mining requirements.



# ROME WIRE

## WIRE-ROME



## There's no Joy without TIREX

All Joy Mechanical Loaders are equipped with Tirex Portable Cable. The makers of these efficient machines have standardized on this tough, flexible, long lasting Cable.

The non-inductive 60% rubber armor of Tirex Cable cannot become charged nor wear through as do cables with braided or woven coverings. This explains why Tirex has been selected for use with these up-to-date loaders.

There's no cable made which stands up so well against the continuous dragging and yanking about inevitable when operating portable underground equipment of this nature.

For loaders, undercutters, drills, gathering locomotives, you can't beat Tirex service.

All sizes are furnished in special lengths as ordered. Full particulars on our entire line of Tirex Cords and Cables will be sent you at once, upon request. Let us know where we can reach you.

**SIMPLEX WIRE & CABLE CO**

Boston New York Chicago San Francisco

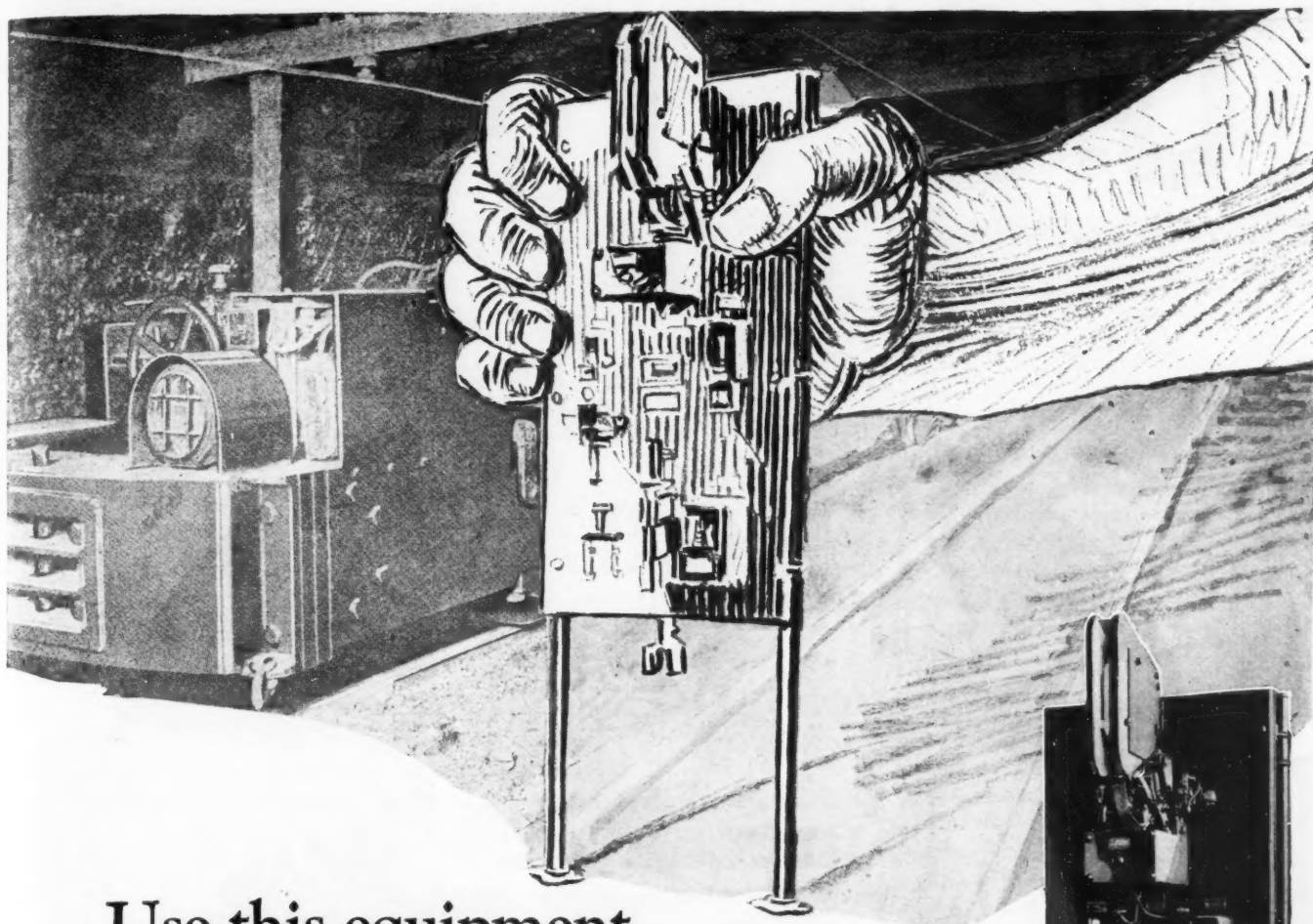
TRADE

# TIREX

MARK

**The Simplex Cable that wears like a Cord Tire**



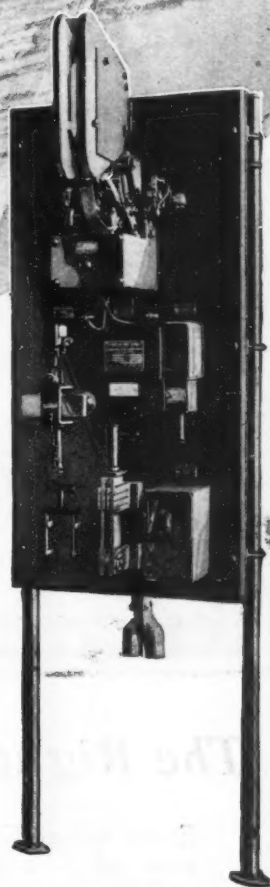


## Use this equipment to reclose feeder circuits and get maximum output

Add up the increases in your output if electric power were kept on your feeder circuits every possible moment and you have a measure of the principal advantage of G-E Automatic Reclosing Feeder Equipment. An exact calculation would be impossible, but a little study will show:

- Production can be increased by a continuity of electric power at the machine under normal conditions.
- Production can be increased by keeping electric power on main lines in case of a disturbance on a feeder.
- Production can be increased by eliminating delays incident to reconnecting an opened feeder circuit manually.

Which means that unless you already have Automatic Reclosing Feeder Equipment you have this opportunity to increase your output and your profits. Talk this over with representatives from our nearest office or send for information.



1640-amp., 275-volt, d-c.  
automatic reclosing equip-  
ment for stub-end feeder



54A-133

# GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

# "U.S." TAPE



## The Right Tape for Every Job Around the Mine!

Every mine electrician knows the importance of buying good tape—tape that is uniform in quality, high in tensile strength, and free from imperfections and pinholes. That's why experienced electricians always specify "U.S." Tape.

There's a complete line of "U.S." Tapes—a type for each particular use:

"U.S." Splicing Compound—A "Relio" splice is there to stay—a solid, waterproof joint, without heating. Scientifically compounded, easy to handle.

"U.S." Holdtite Friction Tape—Heavily coated on both sides with a high grade black rubber compound. For general electrical work.

"U.S." Armature Friction Tape—High quality white rubber friction, one side only of very thin closely woven sheeting.

*There are also five other special "U.S." Tapes*

**United States Rubber Company**

1790 Broadway

New York City

Branches in every industrial center.







## *The Sextette from Lucia, Ky.*

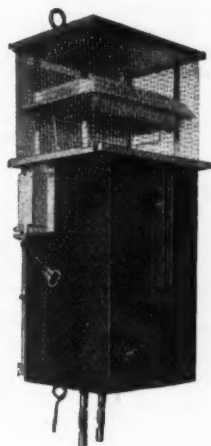
I've been caught in some tight jams already fooling around electrical equipment, but the biggest thrill that ever rattled itself up and down my spinal column was provided in the No. 2 Mine of the Acme Coal Company at Lucia, Ky. Keep your seat and I'll tell you about it. I drops off at this place by invitation one Fall morning and locates the G. M. up on the tippie with the Superintendent, where the two of them are directing the installation of a new loading boom.

"This survival of the fittest propaganda got you steamed up too?" I inquires after we had traded greetings.

"Isn't it the truth?" he smiles. "No kidding, we got to do things around here if we are going to remain out of the class of operators who are sitting around waiting for miracles to happen and provide juicy markets like we had after the big war."

"Wait until I dig up the 'Super,' Foreman and Electrician," he commands, "and I want to get your opinion on what we are going to need in the way of sectionalizing equipment."

A few minutes later the party is assembled and we make tracks for the inside. Well, it develops during the jaunt that they have been



### *The Circuit Breaker with Brains*

experiencing plenty trouble with low voltage coming from one overloaded section compounding itself with other sections carrying legitimate loads. Putting a stop to that is duck soup for us.

Finally we pull up in front of a room off one of the South entries, some mile and a half from the out-

side. Up at the face a machine runner and his helper are fighting a cutter bar putting up a game but losing battle. While we are crouching there the six of us are suddenly bathed in a shimmering green light. There fifty feet from us the cable covering had burned off from the crowding that machine armature had been giving it, and a six- or eight-inch arc was blazing in an atmosphere of suspended bug dust. Right away I get visions of the Wife and Kiddies cashing in my insurance policies, as I momentarily expect to have several tunnels drilled through my liver.

I turned to the "Super" and see him trying to hide a pair of knees shimmieing like a barn door in a cyclone. I get plenty kick out of the entire proceedings before the arc is extinguished, and the General Manager suggests maybe we have seen all we want to inside.

When we reach the surface again, the Boss tells me they have been figuring on our stuff for several weeks, but he knows he is going to get it now from the safety standpoint alone. "A breaker set down in that section to open on a low current value would never have permitted that arc to get started," he says.

And he was right!

## **THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO.**

Columbus, Ohio, U. S. A.

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*Designing, Superintendence, Construction.* Everything for coal mines; Structures, Mechanical and Electrical Installations, Shaft Sinking, Development, Operation. Examinations-Reports-Appraisals. Isabella Bldg., Chicago.

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have found this publicity worth while. You, too, should find it so.

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Examination of Coal for By-Product Recovery, Investigations in By-Product Coke and Gas Manufacture, Ammonia, Tar, Benzols, Gasoline, Refractory Materials.

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Complete coal mine top works. Electrification of coal mines. Tipples, horizontal screens. Power generation and distribution. Send for catalog C.  
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Testing Bituminous Coal Lands a Specialty

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Established 1895

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Incorporated 1905

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**Underground Coal Loaders**

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Particularly for those conditions  
which are unusual or exacting

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Main Office and Works: Cleveland, Ohio.



## WILMOT

**Coal Preparation Specialties**

"KEYSTONE" Rivetless Conveyor Chain saves time, temper and money. Try it where requirements are super exacting. The element of chance is absent with the purchase of any WILMOT equipment. Compound Geared Rolls—Hollow Ground Roll Teeth—Simplex and other Coal Jigs—Flexible Arm Shaking Screens—Castings and Machine Work. Write

**WILMOT ENGINEERING CO., Hazleton, Penn.**  
Works: White Haven, Penn.



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RHEOLAVEUR

**"The Washer that Removes the Refuse  
from Coal as It Travels"**

Built for washing all coal up to 4-in. sizes—both anthracite and bituminous. All manufacturing and patent rights owned and controlled by A. France Focquet, 17 Quai St. Léonard, Liège, Belgium. For particulars address

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Transmit from 1/4 to  
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Put your coal preparation problems up to us.

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Completely Covering the Field of Combustion Engineering with Stokers, Pulverized Fuel and Oil Burning Equipment of its own Manufacture.

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and

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Coal  
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**BIRMINGHAM,  
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"STANDARD" and "JUNIOR" Shaking Screens,  
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As engineer or superintendent with progressive company, large or small; experience in Ohio, West Virginia and Indiana; drift and strip mines; state details first letter. PW-636, Coal Age, Leader-News Bldg., Cleveland, Ohio.

**CHIEF** electrician available. Are you in need of a snappy conscientious man who can get results? Wide experience in upkeep of all kind of mining equipment backed by technical training; all kinds of A.C. and D.C. apparatus; have care of two large mines 5,000 tons daily capacity; age 33, married; best reference. PW-633, Coal Age, Real Estate Trust Bldg., Philadelphia, Pa.

**ELECTRICAL** and mechanical engineer, graduate, age 42, desires position with large coal company; 25 years' experience at mechanical and electrical work; 12 years of these with large coal companies; best references; for personal interview address PW-634, Coal Age, Old Colony Bldg., Chicago, Ill.

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**MANAGER** or general superintendent coal company. Age 37, married. No boozing or has-been. Thoroughly experienced modern mechanical mining. Executive ability and can handle men. PW-627, Coal Age, Real Estate Trust Bldg., Philadelphia, Pa.

**MINING** electrician, age 38, married, reference, ten years' experience, direct and alternating current, maintenance, construction-operation testing; would accept assistant to chief or station operation. Salary agreeable; any location; available now. Will Parks, Denim, N. C.

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**Experienced Electrical Man** familiar with coal mining equipment, to represent well known manufacturer of friction bearings; reply should mention in what capacities formerly employed. RW-639, Coal Age, 10th Ave. at 36th St., New York.

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36-in. gauge storage battery, with or without battery. Give price, details and location.

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Real Estate Trust Bldg., Philadelphia, Pa.

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## Railroad Track Scales

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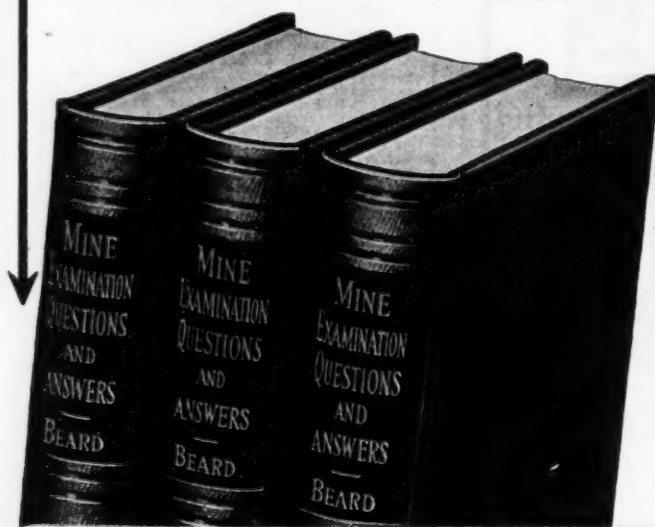
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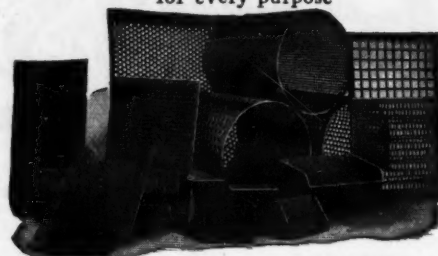
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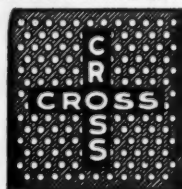
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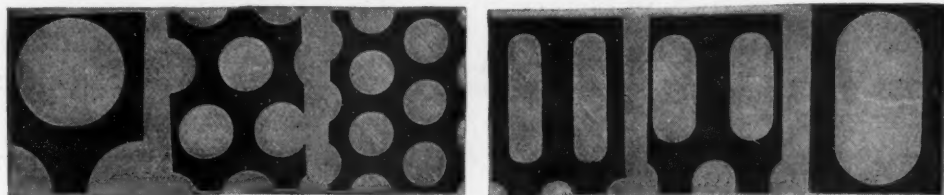
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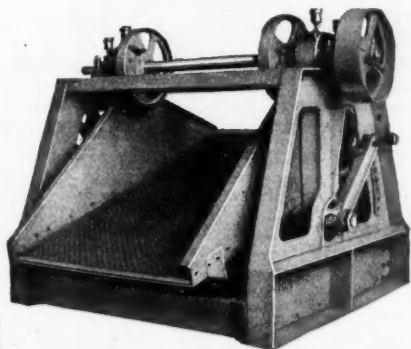
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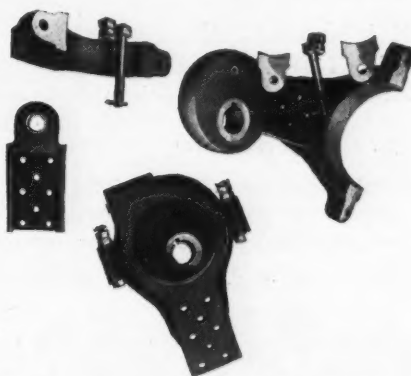
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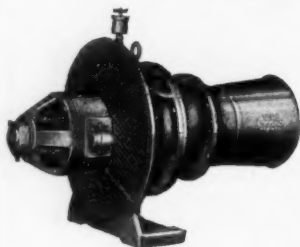
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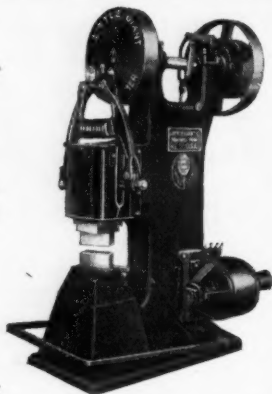
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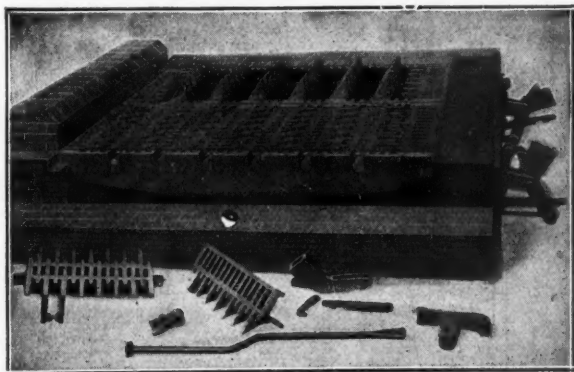
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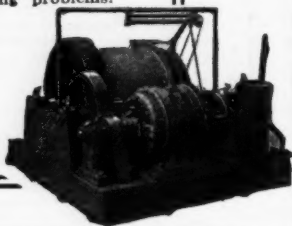
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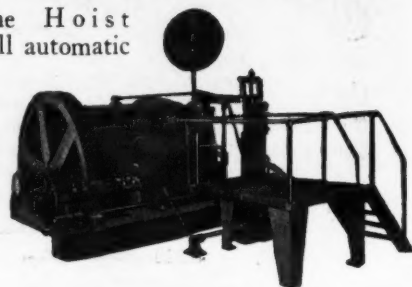
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## Chattanooga ARMATURE WORKS.

REWINDING ELECTRICAL  
PAIRING BUILDING MACHINERY

CHATTANOOGA, TENN

## FOOTE BROS. Speed Reducers

mean  
TRANSMITTING POWER  
SAFETY, ECONOMY & EFFICIENCY IN  
**FOOTE BROS. GEAR & MACHINE CO.**  
226-236 N. CURTIS ST., CHICAGO, ILL.



## MEDART means EVERYTHING

Line Shafting Equipment

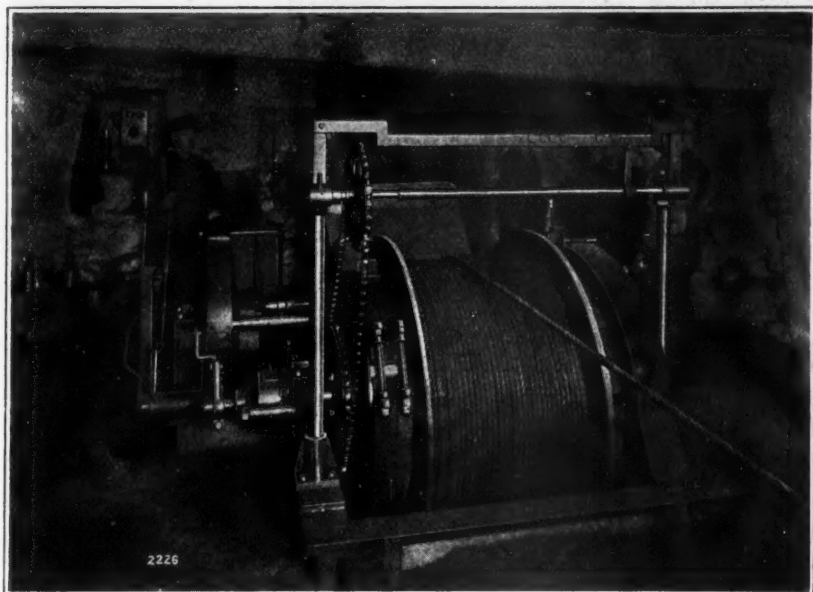
**THE MEDART COMPANY**

(Formerly Medart Patent Pulley Co.)

General Offices and Works: St. Louis, U. S. A.  
Office and Warehouse: Cincinnati Offices: Chicago and Philadelphia



# LIDGERWOOD MINE HOISTS



## ELECTRIC—STEAM

*We build mine hoists of all types and sizes, to meet the many varied conditions of mine service. Each type is designed and built to meet the requirements of each installation.*

The illustration shows an electric hoist in use by the Spencer Coal Co. It is working on an underground slope, giving the best of satisfaction. The drum coils 1,800 ft. of rope; hoist has a rope pull of 7,000 lbs. at 500 f.p.m.

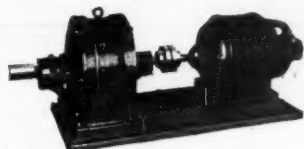
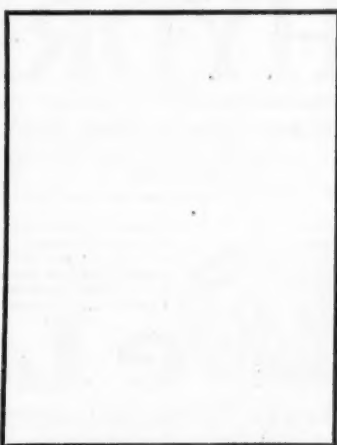
*Catalogs Upon Request*

**Lidgerwood Mfg. Co., 96 Liberty Street, New York**

Philadelphia Pittsburgh Chicago Detroit Seattle Birmingham, Ala. Los Angeles Portland, Ore. Columbus, O. Tacoma  
London, England Sao Paulo, Brazil Rio de Janeiro, Brazil  
Woodward, Wight & Co., New Orleans, La. John D. Westbrook, Inc., Norfolk, Va. Norman B. Livermore & Co., San Francisco

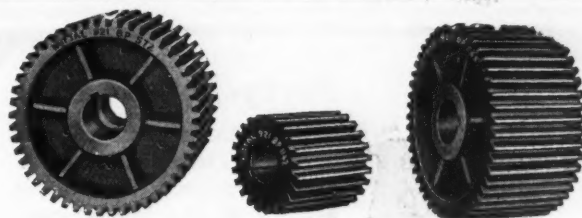
***This →  
space  
reserved  
for you***

It indicates the relative proportions of the D. O. James speed reducing book—which is yours on request. We could show the cover of this book but that wouldn't help you solve your problems of direct-connected drives.



THE D. O. JAMES MFG. CO.  
1120 W. Monroe St., Chicago, Ill.

**D.O. JAMES**  
**SPEED REDUCERS**



**4 to 1—it's a Nuttall Gear**  
if it lasts 4 times as long.

Nuttall BP Gears last four times as long as untreated gears—and then some.

It saves 70% to use them on your mining machines, locomotives, hoists, pumps, etc.

*Ask for Bulletin.*

**R.D. NUTTALL COMPANY**  
**PITTSBURGH PENNSYLVANIA**

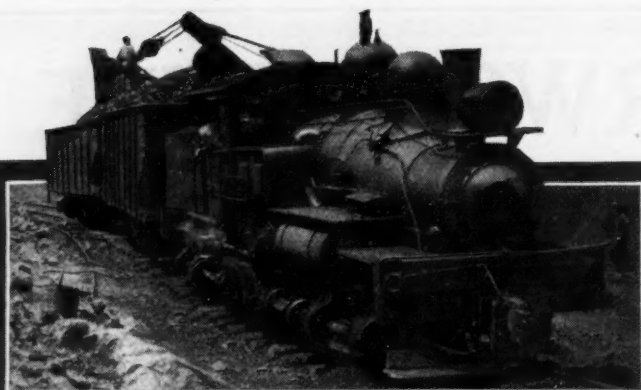
Philadelphia Office: Westinghouse Bldg., 30th and Walnut

Chicago Office: 2133 Conway Bldg.

Canadian Agent:

Lyman Tube & Supply Co., Ltd., Montreal and Toronto

**Nuttall**



## THE SHAY Is the Standard of Comparison

WHEN geared industrial locomotives are discussed, the standard of comparison, by which others are judged, is the Shay.

"We believe and know," writes the owner of one company, "that the Shay is the best and surest power on the market. It is very economical in operation and handles a larger tonnage than any other kind of power on the market today."

Nearly half a century ago, the original

Shay Geared Locomotive was designed to operate under great difficulties.

Built particularly for hard service, the Shay Geared Locomotive has proven ideal for operation in almost inaccessible places, on sharp curves and steep grades, with temporary unballasted track.

Before you choose new engines for your work, compare them with the strip mine standard—Shay Geared Locomotives.

**LIMA LOCOMOTIVE WORKS, Incorporated**

17 East 42nd Street, New York

Lima, Ohio



FIG. 50  
Vertical Triplex Pump

### Forty-Three Years

of pump building stand back of every Deming Pump to guarantee long dependable service at the lowest cost for operation and upkeep.

Complete Mine Pump Bulletin on Request  
**THE DEMING CO.** Est. 1880 Salem, Ohio  
"Distributors in All Principal Cities"

**Deming**  
HAND AND POWER **PUMPS** FOR ALL USES

## HYDRELEC

Columbus Gear & Pump Co.  
330 E. Second Ave.  
Columbus, Ohio

**Pumps**



Steam Turbines, for all speed and steam conditions. Catalog D71.  
Double Helical Speed Reducing Gears. Catalog G71  
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**De Laval**  
Steam Turbine Company, Trenton, N.J.

### ATLAS

Mine Locomotives

**THE ATLAS CAR & MFG. COMPANY**

Engineers

CLEVELAND, O.

Manufacturers



## ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Power and Electrical Machinery, Mining Machinery, Pumping Engines, Centrifugal Pumps, Crushing Machinery, Steam and Electric Hoists, Power Transmission Machinery, Timber Treating and Preserving Machinery, Air Compressors.

WHEN buying a locomotive consider Quality, Long Life—then investigate the advantages a PORTER offers.

Bulletins on Request

**H. K. PORTER COMPANY**

Established 1865

PITTSBURGH, PA.

## THE IRONTON STORAGE BATTERY LOCOMOTIVE

**The Ironton Engine Co.**  
Ironton, Ohio

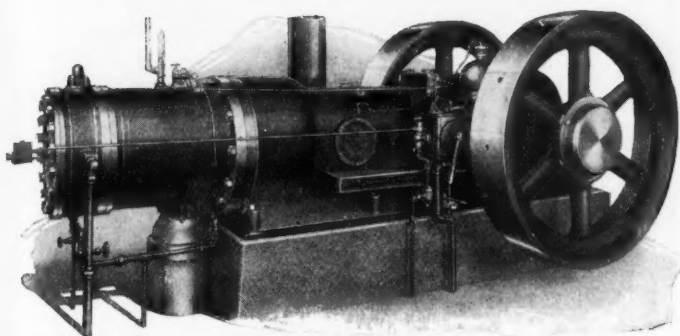
**EFFICIENT**, economical hauling. Find out about storage battery locomotives for your hauling. The Ironton is the best storage battery locomotive.





# PRIMM

## OIL ENGINES



### Fuel Economy— Greater Than Ever

**T**he PRIMM Oil Engine has always been noted for great fuel economy, advanced design and trim appearance. When we produced the type "BU" PRIMM Engine a few years ago it was met with acclaim by engineers as the finest type of low compression oil engine yet produced.

OUR engineers did not then consider their task ended—they still experimented—they still sought to effect improvements. It seemed they could do no more for the type "BU" PRIMM Engine was indeed a wonder.

Recently their efforts were rewarded. They made several new discoveries which have been incorporated in the new type "SBU" PRIMM Engine—the greatest of them all.

Greater simplicity of design, vastly increased fuel economy and an exceedingly handsome appearing PRIMM Engine is the result of their efforts. To those who are interested in this most efficient of prime movers we shall be pleased to send a descriptive bulletin.

**20 to 300 H. P.**

**Semi-Diesel**

**The  
Power Mfg. Co.**

**720 Cheney Avenue**

**Marion, Ohio**

*"Tool Steel" gears  
In severest test,  
For thirteen years  
Have proven best."*

The Tool Steel Gear & Pinion Co.  
Cincinnati, Ohio



## The Riveted Plate Frog

Here's a Frog made of steel plate with rails riveted together. Strong, durable, stands the gaff.

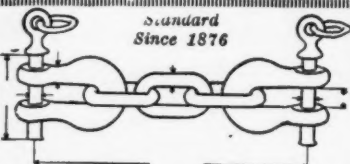
Let us tell you about our full line of trackwork, dumps conveyors, cars, etc.

**HELMICK**  
FOUNDRY & MACHINE CO.  
FAIRMONT, WEST VA.

### "SUPERIOR"

#### Mine Car Hitchings

The extra strength of "Superior" Mine Car Hitchings assures safety and long service life. We have specialized on "Superiors" since 1876 and will offer you facts to prove in how many ways they are better.



Standard  
Since 1876

Pittsburgh Knife and Forge Co. Coraopolis, Pa. Established 1876  
Successors Pittsburgh Steel Mfg. Co. and Wm. Harris & Son Co.

ROTARY CAR-DUMPERS FOR MINE CARS  
(GRAVITY, ELECTRICAL OR PNEUMATIC DRIVE)

CHICAGO  
ILL.

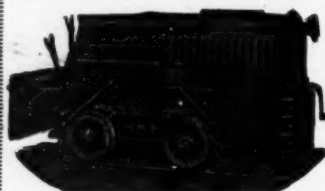
THE MECHANICAL SPRINGER  
AUTOMATIC TRIP CONTROL EQUIPMENT

"SOLIDCAR" SELF-DUMPING CAGES  
CAR CONTROL AND CAGING EQUIPMENT

PITTSBURGH  
PA.

ROTARY CAR-DUMPERS FOR  
STANDARD GAUGE RAILROAD CARS

**CAR-DUMPER & EQUIPMENT CO.**



## PLYMOUTH Gasoline Locomotives

For mine use and general industrial haulage. Made in 3 to 15 ton sizes and in any track gauge. Write for Catalogs and Performance Bulletins.

THE FATE-ROOT-HEATH CO.  
Plymouth, Ohio

**Waverly**  
ALL PENNSYLVANIA

## OILS and GREASES for MINE CARS and MACHINERY

Refined from All Pennsylvania  
Paraffin Base Crude Petroleum  
SEND FOR OIL AND GREASE CHARTS

Waverly Oil Works Company  
5500 54th ST., PITTSBURGH, PA.

GO TO YOUR LOCAL MINE SUPPLY DEALER



## Decrease Haulage Costs

— WRITE FOR CATALOG —  
Geo. D. Whitcomb Company  
ROCHELLE — ILLINOIS

SEE OUR ADVERTISEMENT IN THE FIRST ISSUE OF EACH MONTH

**SWEET'S**  
Track Materials  
The World's Standard for over 20 Years  
Sweet's Steel Co. - Williamsport, Pa.

### LIGHT STEEL RAILS

8, 12, 16, 20, 25, 30, 35, 40 lb. per yard  
Splices, Spikes, Frogs and Switches

**UNITED STATES RAIL CO.**  
CUMBERLAND, MARYLAND

## NEW and RELAYING RAILS

1 TON OR 1000

TRACK  
EQUIP-  
MENT

**L.B. FOSTER CO.**

PITTSBURGH - PENNSYLVANIA

RAIL  
ACCESS-  
ORIES

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

## The West Virginia Rail Co.

Manufacturers  
Light Steel Rails

8-12-16-20-25-30-35-40-45-50-lbs. per yd.

Frogs & Switches—Steel Mine Ties  
Huntington, W. Va.

**KOPPEL** CARS **KOPPEL**  
TRACK  
SWITCHES  
**KOPPEL INDUSTRIAL CAR & EQUIP. CO.**  
KOPPEL, PA.

## The Secret of Good Bonding

is good welding; the secret of good welding is a good welder.

### AJAX ELECTRIC ARC WELDER

has made good everywhere. Always ample amperage in spite of voltage drop. Only ample amperage insures adequate penetration; only adequate penetration insures a lasting weld. Rugged, light, inexpensive.

Write for bulletin.

Railway Track-work Co., Philadelphia

216

## THE SEARCHLIGHT SECTION

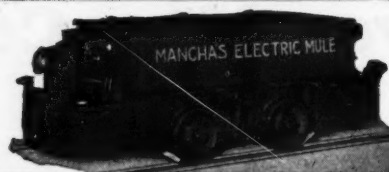
Man you want  
will locate the Position you want  
Equipment you want

Are you using the Searchlight?

## Mancha's Electric Mule

Mancha Storage Battery Locomotive Co.  
St. Louis, Mo.

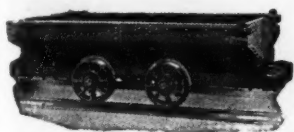
Representatives in All Principal Cities





## THE LORAIN STEEL COMPANY

Johnstown, Pa.



Manufacturers of Steel and Composite mine cars, and all kinds of mine track work.

### Sales Offices:

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Philadelphia Pittsburgh

### Pacific Coast Representative:

United States Steel Products Company  
Los Angeles Portland San Francisco Seattle

### Export Representative:

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## HULBURT'S

Mine Car Grease  
Mining Machine Lubricant  
Locomotive Lubricant  
Wool Yarn Elastic Grease  
Cup Greases  
Cable Grease  
Mechanical Loader Grease

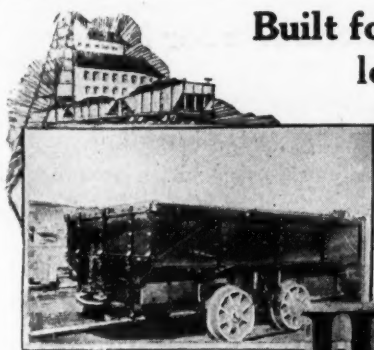
HULBURT OIL & GREASE CO.  
Specialists in Coal Mine Lubrication.

Gen'l Offices & Works: Phila., Pa.  
Distributing Points  
Throughout Coal  
Mining  
Fields.

Drive out the Friction Devils.



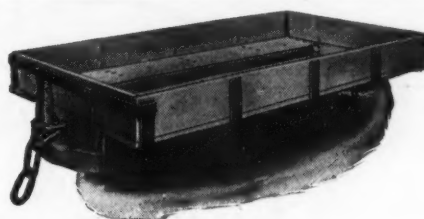
## Built for the long, hard run



The "Channel-Bar" truck—the cold rolled steel floating axles with dust proof bearings—the steel plate center bumpers—these features explain in part the Irwin capacity for long service.

# IRWIN

Irwin Foundry & Mine  
Car Co.  
Irwin, Pa.



## Complete Cars Trucks of all Types

Builders of the Hollow Axle Truck

SOUTHERN WHEEL COMPANY  
ST. LOUIS, MO. BIRMINGHAM, ALA.

## Leschen Wire Rope Is Dependable

When you buy Leschen Wire Rope you are not experimenting, for its ability has been proven by its service record. For heavy mine hoisting and haulage and for steam shovels, mining machines, etc., we recommend Hercules (Red-Strand) Wire Rope because its unusual durability enables it to work with marked economy under such conditions.

Established 1857

A. Leschen & Sons  
Rope Co.  
St. Louis, Mo.

New York Chicago Denver  
San Francisco



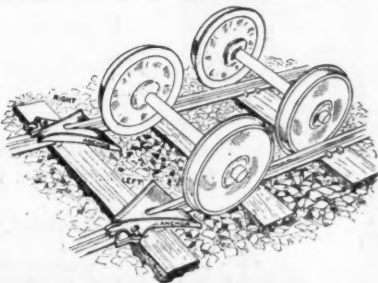
A  
NOLAN  
Saves  
Labor

at any mine. Write for data.  
THE MINING SAFETY DEVICE CO.  
Bowerston, Ohio

## 'ANCHOR' RERAILERS

You should carry a pair on every locomotive  
ARE YOU

still trying to retrack cars and locomotives with crude blocks, props, etc., and wasting half an hour or more? If so, try "Anchor" Rerailers, and see how easy it is done. The time saved at one wreck pays for their cost.



T. H. EDELBLUTE CO. Wabash Bldg.  
Pittsburgh, Pa.



## Reputation

A good reputation is the silent voice of approval by a multitude of satisfied customers. Green's "Durabil" Titanium Frogs enjoy a good reputation—proof that they have in every way lived up to the highest expectations of their users.

L. A. Green Railway  
Equipment Co.  
First National Bank Bldg.  
Pittsburgh, Pa.

Send for  
latest Bulletin

# Fast, safe mine "rail- roading"

## CENTRAL Mine Track Equipment

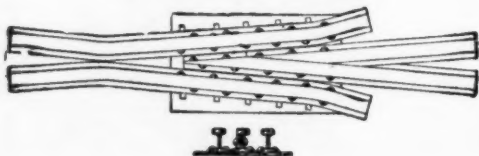
Today's mining problem is a problem of getting out coal at lower cost, and good track work is a first essential in this new drive for efficiency and economy.

CENTRAL frogs, switches, crossings, turnouts, switchstands, etc., are doing their part by making mine "railroading" safer—even at high speeds—eliminating delays, tie-ups and other troubles that cut down production figures. Smooth, continuous transportation requires expertly designed and well-built equipment at the vital haulage points and CENTRAL products are giving this type of service at many mines.

No track equipment gets harder service with less upkeep than mine trackage.

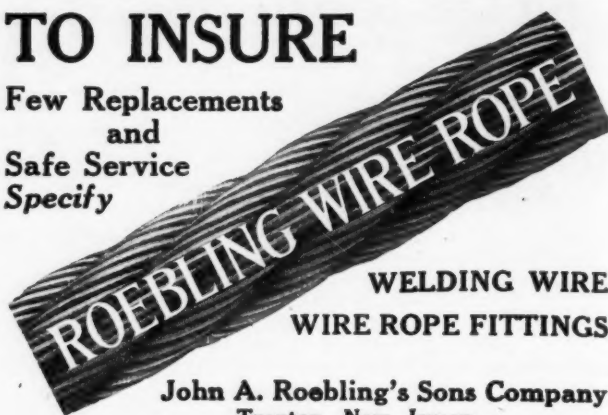
This is just one reason why better quality is built into CENTRAL frogs and switches, and why they stand all the pounding of heavy locomotives at high speed coupled to strings of loaded cars.

**The Central Frog & Switch Co.**  
Cincinnati, Ohio



## TO INSURE

Few Replacements  
and  
Safe Service  
Specify



WELDING WIRE  
WIRE ROPE FITTINGS

John A. Roebling's Sons Company  
Trenton, New Jersey

## Bethlehem Products for Mines



Parallel Three  
Switch Stand,  
Model 1211.

Frogs, Switches, Switch Stands, Rails, Splice  
Bars, Bolts, Spikes, and Cambria Mine Ties.

## BETHLEHEM STEEL COMPANY

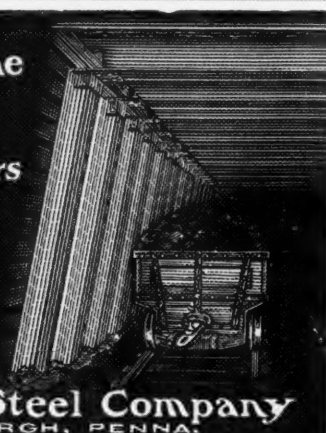
General Offices: Bethlehem, Pa.

Sales Offices in the Following Cities:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh  
Buffalo Cleveland Cincinnati Detroit Chicago St. Louis San Francisco

## Equip Your Mine With Steel

Steel Mine Timbers  
Steel Cross Ties  
Wheels-Axles  
Rails-and  
Accessories



**Carnegie Steel Company**  
PITTSBURGH, PENNA.

## DUNDEE "A" AND "B" FRICTION TAPES



Great Adhesive  
Strength  
High Quality  
Long Life  
Priced Right



Write for Samples and Circulars

**THE OKONITE Co., Passaic, N. J.**  
Incorporated 1884

Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.  
Agents: Central Electric Co., Chicago, Ill.; Fettingoli-Andrews  
Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cin-  
cinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.  
Canadian Representatives: Engineering Materials Limited, Montreal.





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For Alphabetical Index See Last Page

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American Steel & Wire Co.  
Interstate Equipment Corp.  
Leschen & Sons Rope Co., A.

**Air Aftercoolers**  
Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.

**Air Receivers**  
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(See Circuit Breakers, Electric)

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Link-Belt Co.  
Marion Mch. F. & S. Co.  
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**Cranes, Locomotive**  
Link-Belt Co.

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Bartlett & Snow Co., C. O.  
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Link-Belt Co.  
Marion Mch. F. & S. Co.  
Pennsylvania Crusher Co.  
Raymond Bros. Impact Pulverizer Co.  
Sturtevant Mill Co.  
Vulcan Iron Works  
Webster Mfg. Co.

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Sturtevant Mill Co.

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Hulburt Oil & Grease Co.

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Bridell Co., Inc., W. C.  
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Foster Co., L. B.  
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Gregory Electric Co.  
Hyman-Michaels Co.  
Lindheimer, S. W.  
Miller-Owen Electric Co.  
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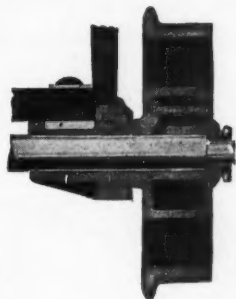
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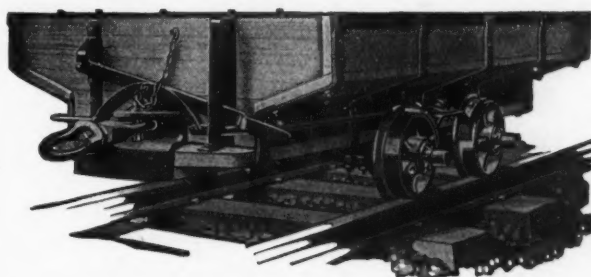
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